JUNIOR MODERN GEOGRAPHY

JUNIOR MODERN GEOGRAPHY

2 copies

BY

RAI SAHIB J. N. GHOSH

M.Sc. (Cal.), B.T. (Punjab), F.R.G.S. (Lond.)

Professor of Geography, Government Teachers' Training College, Patna

INSTITUTE OF EDUCATION FOR WOMEN
1497(2)
Dept. of Extension
SERVICE.
CALCUTTA-27

910
Gho

INDIAN BRANCH

GEOFFREY CUMBERLEGE
OXFORD UNIVERSITY PRESS

Oxford University Press, Amen House, London, E.C.4
GLASGOW NEW YORK TORONTO MELBOURNE WELLINGTON
BOMBAY CALCUTTA MADRAS CAPE TOWN
Geoffrey Cumberlege, Publisher to the University

First published 1935
Third impression 1950

PRINTED IN GREAT BRITAIN BY HEADLEY BROTHERS
109 KINGSWAY, LONDON, W.C.2; AND ASHFORD, KENT
from plates

PREFACE

This book of Junior Geography has been written in accordance with the curriculum prescribed for classes VIII and IX of English High Schools in Bihar and Orissa. Most teachers of the subject in these classes have often felt the need of a suitable textbook written from our point of view. I have tried my best to minimize the language difficulty by making use of simple words and short sentences throughout the book. Although it has been written for the junior forms of our schools, there is no provincial bias in the syllabus and it is hoped that the book will be useful to boys in the pre-matriculation stage in any part of India.

The chapters have been arranged in what seems to me the most logical sequence, and the most interesting way from both the teacher's and the student's point of view. But for those who wish to follow the Bihar and Orissa syllabus strictly, step by step, the table on page xiii sets forth the syllabus with the relative chapter for each item.

The attention of teachers is particularly drawn to the collection of questions at the end of the book. Very few of these can be answered without a real understanding of the subject.

ACKNOWLEDGEMENTS

The Publishers' thanks are due to Messrs. George G. Harrap & Co., Ltd., for permission to reproduce the illustrations on pp. 80, 89, 92, 111, 130, 131, 135, 142 (both), 143 and 146 from Albert Wilmore's *Junior School Geography*; and those on pp. 7 (map), 72, 83, 100, 114 (both), 119, 123 and 144 from W. C. Brown and P. H. Johnson's *Home of Man*.

CONTENTS

CHAPTER PAGE
I Study of the World as a Whole from the Globe . 1
II Determination of Altitude 3
III Methods of Finding the North Point . . . 5
IV Voyages of Early Navigators and Explorers . 7
V Monsoons, Seasons, Latitude and Longitude . . 9
VI Climate 14
VII Agricultural Land 24
VIII India and Burma Treated as a Whole. The Great Regional Divisions 30
IX Delhi 37
X The Himalayas 40
XI The Indo-Gangetic Plain 50
XII The River Ganges 56
XIII The Ganges Delta 58
XIV Calcutta 63
XV The Deccan 66
XVI The Coastal Plains 71
XVII Bombay 77
XVIII The Western Ghats 82
XIX Sind 85
XX An Irrigated Area 87
XXI Forests 91
XXII Cotton Cultivation and Manufacture . . . 94
XXIII Tea Cultivation 97
XXIV Jute Cultivation 98
XXV A Coalfield 99
XXVI An Oilfield 103
XXVII Burma 105
XXVIII Europe 110
XXIX The British Isles 125
Appendix A. Geographical Excursions 149
Appendix B. A Brief Glossary of Geographical Terms used in the book 150
Appendix C. Questions for Discussion in the Class . . 153

LIST OF ILLUSTRATIONS

PAGE

The World 2

Finding Altitude of the Sun 4
By courtesy of The Royal Geographical Society.

Determining Latitude 4

The Points of the Compass 5

Finding North from a Watch 6

The Pole Star and the Great Bear 6

Map of the Route Taken by Columbus 7

The Flagship of Columbus 7

The First Ship that Sailed Round the World . . . 8
Magellan's *Victoria*, from Hulsius's *Collection of Voyages*, 1602.

Vasco da Gama 8
From a contemporary portrait.

Winter Monsoon 9

Summer Monsoon 10

The Cause of Seasons 10

Day and Night at Different Seasons 11

How Latitude is Measured in Degrees 12

How Longitude is Measured in Degrees 13

Effects of the Sea on Temperature 15

Cause of Sudden Changes of Temperature in the United States 16

Rainfall in the Himalayas 16

Effect of North and South Slopes 17

An Equatorial Forest 19
Photograph by H. J. Shepstone.

Savanna Landscape 20

Arctic Scenery 22

Soils Map of India 26

Area given to Principal Crops of India 27

Areas of Wheat, Rice and Cotton in India 28

The Position of India 31

Routes to India and the East 32

PAGE
THE MAJOR CLIMATIC REGIONS OF INDIA 33
CAUSE OF MONSOONS IN INDIA 34
RAINFALL AT CHERRAPUNJI 35
KASHMIR GATE, DELHI 37
DELHI GUARDS THE GATEWAY TO THE PLAINS 38
DELHI RIDGE 39
THE VICEROY'S HOUSE, DELHI 40
THE WAR MEMORIAL ARCH, DELHI 40
THE COUNCIL HOUSE, DELHI 40
THE IMPERIAL SECRETARIAT, DELHI 40
HEIGHTS OF GREAT MOUNTAINS OF THE WORLD 41
THE SNOWS, DARJEELING (TEA GARDEN IN FOREGROUND) . . 42
By courtesy of the Indian Tea Association.
NORTH-SOUTH SECTION OF THE HIMALAYAS 43
RAILWAY CUTTING THROUGH TERAI 44
Photograph by Bourne & Shepherd, India. By courtesy of P. & O. Steamship Co., Ltd.
DIAGRAM SHOWING ROUGHLY THE POSITION OF THE SNOWLINE . 45
A GLACIER 46
Photograph by Photochrome.
ON THE DARJEELING-HIMALAYAN RAILWAY 48
By courtesy of the Darjeeling Himalayan Railway Co., Ltd.
THE MAIN CURRENTS OF THE S.-W. MONSOON 51
THE TAJ MAHAL, AGRA 53
Photograph by Will F. Taylor.
BENARES, WITH THE MOSQUE OF AURUNGZEB IN THE BACKGROUND 55
Photograph by Frith & Co., Ltd.
THE VALLEY OF THE GANGES 57
THE GANGES-BRAHMAPUTRA DELTA 59
FORMATION OF A DELTA 60
THE SUNDARBANS 61
By courtesy of Sir S. Eardley-Wilmot.
OLD COURT HOUSE STREET, CALCUTTA 64
SKETCH MAP SHOWING THE POSITION OF CALCUTTA 65
SLOPE OF THE DECCAN AS SHOWN BY THE RIVERS . . . 67
DIAGRAMMATIC SECTION ACROSS THE DECCAN SHOWING THE GENERAL SLOPE TOWARDS THE EAST 68

LIST OF ILLUSTRATIONS

PAGE
THE BLACK COTTON SOIL AREA 69
THE FAMOUS TEMPLE AT MADURA 70
SAND DUNES 72
THE PART OF THE DECCAN THAT GETS MORE RAIN IN SUMMER THAN IN WINTER 73
COCONUT PALMS ON THE MALABAR COAST 74
EXTRACTING COPRA FROM COCONUTS 75
By courtesy of the Curator, from the Imperial Institute Collection, London.
THE ISLAND OF BOMBAY 78
SKETCH MAP SHOWING THE SITUATION OF BOMBAY . . . 78
UNLOADING LOCOMOTIVES AT BOMBAY DOCKS 79
By courtesy of G.I.P. Railway Publicity.
WEAVING LOOMS IN A BIG FACTORY 80
By courtesy of Salts (Saltaire), Ltd.
A VIEW OF BOMBAY 80
Photograph by E.N.A.
A VIEW OF ONE OF THE MAIN THOROUGHFARES OF BOMBAY . 81
Photograph by *Times of India* Press, Bombay.
TRAIN ASCENDING THE WESTERN GHATS ON THE BOMBAY-POONA LINE 82
By courtesy of G.I.P. Railway Publicity.
THE DAMMING OF A RIVER 83
WHY THE DECCAN GETS A SMALL AMOUNT OF RAIN . . . 84
CANAL-IRRIGATED AREA IN SIND 86
THE CHIEF IRRIGATION CANAL WORKS OF INDIA 88
SUKKUR: THE LLOYD BARRAGE 89
Photograph by E.N.A.
INDIA: AREAS IRRIGATED FROM TANKS 90
EQUATORIAL FOREST 92
By courtesy of the Booth Line.
SCENE IN A LARGE COTTON MILL 95
Photograph by courtesy of Tootal Broadhurst Lee Co., Ltd.
COTTON DEPOT, BOMBAY 96
By courtesy of G.I.P. Railway Publicity.
TEA PICKING 97
By courtesy of the Indian Tea Association.
KIND OF FOREST FROM WHICH COAL HAS BEEN FORMED . . 100
A COAL MINER AT WORK 101
Photograph by Topical Press Agency.

PAGE
THE COALFIELDS OF BIHAR AND BENGAL 102
MINEHEAD OF A COALPIT 102
DERRICKS AND STORAGE TANKS ON AN OILFIELD IN THE UNITED STATES 103
By courtesy of the Chamber of Commerce, Los Angeles.
PIPES FOR CARRYING OIL TO THE REFINERY 103
By courtesy of Anglo-Persian Oil Co., Ltd.
AN OIL TANKER 104
By courtesy of Anglo-Persian Oil Co., Ltd.
A SCENE IN BURMA 105
BURMA 106
BURMESE LADIES 107
Photograph by Carthew & Kinnaird, Ltd.
THE DRY ZONE OF BURMA 107
ELEPHANTS PILING TEAK 108
Photograph by Will F. Taylor.
A SCENE IN BURMA—THE LAND OF THE PAGODAS . . . 109
Photograph by Will F. Taylor.
EUROPE AND ASIA COMPARED 111
STRUCTURE OF EUROPE 112
MOUNTAINS OF NORWAY 113
By courtesy of the Norwegian State Railways.
MOUNTAINS OF SOUTH EUROPE 114
MOUNTAIN SYSTEMS OF EUROPE 114
CLIMBING IN THE ALPS 115
Photograph by Donald McLeish.
CLIMATIC DIVISIONS OF EUROPE 116
RAINFALL MAP OF EUROPE 117
VEGETATION MAP OF EUROPE 118
VEGETATION—WHEAT, OATS, BARLEY, RYE, FLAX 119
GATHERING LEMONS IN ITALY 120
Photograph by Will F. Taylor.
GATHERING GRAPES IN PORTUGAL 121
Photograph by E.N.A.
ORANGES GROWING 122
By courtesy of the Instituto de Expansao Commercial, Brazil.
COAL AND IRON REGIONS OF EUROPE 123
CONTINENTAL SHELF OF N.-W. EUROPE 125

PAGE
LAND'S END 126
By courtesy of the Great Western Railway Co., Ltd.
CHALK CLIFFS OF DOVER 127
Photograph by Will F. Taylor.
THE NORFOLK BROADS 127
Photograph by *The Times*.
HILLS AND PLAINS OF THE BRITISH ISLES 128
MEAN ANNUAL RAINFALL OF THE BRITISH ISLES 129
WHEAT-LAND IN ENGLAND 130
TYPES OF BRITISH CATTLE 131
Photographs by Topical Press Agency.
THE WHARF OF A FISHING PORT 132
Photograph by Topical Press Agency.
HOP PLANTS GROWING 133
Photograph by Topical Press Agency.
COALFIELDS OF GREAT BRITAIN 134
THE WINDING GEAR OF A COAL MINE 135
NEARNESS OF COAL AND IRON MINES HAS HELPED THE INDUSTRIAL DEVELOPMENT OF ENGLAND 135
INSIDE A GREAT STEEL WORKS 136
MACHINES IN A PIN FACTORY 137
By courtesy of Messrs. Kirby, Beard & Co., Ltd., Birmingham, England.
A SCENE IN THE BLACK COUNTRY 138
SCENE IN A GREAT SHIPBUILDING YARD 139
By courtesy of Vickers-Armstrongs, Ltd.
COTTON TOWNS OF LANCASHIRE 140
COTTON WEAVING BY MACHINE 141
INSIDE A HOSIERY FACTORY 142
By courtesy of Two Steeples, Ltd.
A MODERN LACE MAKING MACHINE 142
A LINCOLN RAM 143
Photograph by Topical Press Agency.
GREAT BRITAIN LIES AT THE CENTRE OF THE LAND SURFACE OF THE GLOBE 144
A STAG 145
Photograph by Fox Photos.
LAUNCHING A SHIP AT BELFAST 146
VIEW OF OXFORD 147
Photograph by Photochrome.

For Classes VIII and IX of English High Schools in Bihar and Orissa

CLASS SYLLABUSES IN GEOGRAPHY

CLASS VIII

I

Simple Geographical Studies of India and Burma.

1. The Himalayas—
   Position. Extent. Altitude. Peaks. Mount Everest. Snowline. Glaciers. Sources of great rivers. Lakes. Health resorts.
   Chapter X
2. The Indo-Gangetic Plain—
   Origin. Extent. Nature of soil. Relation of fertility to rainfall. Density of population. Important towns.
   Chapter XI
3. The Deccan—
   Position. Extent. Origin. Relief. Drainage. Soil. Climate. Density of population. Important towns.
   Chapter XV
4. The Coastal Plains—
   Position. Extent. Origin. Compare east and west coasts. Coast line. Nature of soil. Rainfall. Chief products. Density of population. (Compare east and west coasts.) Important towns.
   Chapter XVI
5. The Western Ghats—
   Position. Altitude. A great watershed. Sources of rivers. Courses of rivers on each side. Rainfall. Effect on South-West Monsoon. Climate on eastern and western sides of the range.
   Chapter XVIII
6. Burma—
   Position. Boundaries. Relief. Rainfall. Drainage. Soil. Climate. Chief products. Density of population. Important towns.
   Chapter XXVII
7. Sind—
   Position. Boundaries. Rainfall. Temperature in hot and cold seasons. Nature of soil. Rivers and canals. Their effect on fertility of soil. Density of population.
   Chapter XIX

8. An Irrigated Area—
Reasons for irrigation. Methods of irrigation from canals, wells, tanks, streams. Compare methods in the Punjab and Madras. Description of the Sone, Orissa and Tribeni canals.

Chapter XX

9. A Coalfield—
A coal mine. Methods of coal extraction. Dangers of coal mining. Precautions taken to avoid them. The uses and economic importance of coal. Coalfields in India. Their distribution.

Chapter XXV

10. The River Ganges—
Its source. Its course. Its length. Volume of water. Floods. Navigation. Tributaries. Canals. Towns.

Chapter XII

11. Agricultural Land—
Different kinds of soils. Their origin and composition. Alluvial soil. Black cotton soil. Laterite. Effect of rainfall on agriculture. Agricultural methods. Chief crops. Harvests.

Chapter VII

12. Cotton Cultivation and Manufacture—
Where grown. Description of cultivation and picking. Manufacture. Cotton mills and presses. Cotton-weaving as handicraft and factory industry. Cotton seed and extraction of oil.

Chapter XXII

13. Jute Cultivation—
Where grown. Its manufacture and uses. Sacking. Hessian cloth. Jute mills. Export of raw and manufactured jute.

Chapter XXIV

14. Tea Cultivation—
Value of export.

Chapter XXIII

Where grown. Conditions favouring growth. Methods of cultivation.

15. Forests—
Different types of forest. Their distribution and extent. Economic importance of forests. Forest products. Forest protection and manage-
ment.

Chapter XXI

16. Calcutta—
A great port, situated on a river. Distance from sea. Overseas trade. Communication with places inland. Manufacture. Imports and exports. University and Schools. Public buildings. Parks. Population. Races and languages.

Chapter XIV

17. Bombay—
Chief seaport of western India. Situation. Description of docks and harbour. Lighthouse. Connexions with countries overseas. Communication with places inland. Exports and imports. Cotton manufacture. Other industries. Education. Population.

Chapter XVII

18. Delhi—
Political capital of India. Reasons for its selection. Situation. Its history. Communications by rail, road, etc. Buildings. Industries.

Chapter IX

19. Ganges Delta—
Its origin and formation. Soil and vegetation. Compare with other great deltas.

Chapter XIII

20. An Oilfield—
Method of obtaining oil. Where found. Its nature and uses. Economic importance. Compare with coal.

Chapter XXVI

Study of the world as a whole from the globe. Relief of the globe. Continents and oceans. Voyages of the early navigators and explorers.

Chapter I
Chapter IV

Methods of finding the North Point.

Chapter III

CLASS IX

India and Burma treated as a whole. The great regional divisions. Comparative study of different climatic regions with reference to position, latitude, altitude, production and other factors.

Chapter VIII

II

1. The Monsoon. The Seasons. Variations in length of day and night. Latitude and Longitude.

Chapter V

Climate

Chapter VI

2. General geography of Europe. The great plains, mountain ranges and rivers. The coastline and adjacent seas. Their effect on climate. The Gulf Stream and its effect on climate.

Chapter XXVIII

3. The British Isles. Their position. Coalfields of England and Scotland. Iron manufactures. Textile industries. Fisheries. Famous Universities and Schools.

Chapter XXIX

III

Observational and Practical Work—

Making of maps and plans. Sand modelling. Simple weather observations including records of rainfall and temperature. Prevailing winds. Clouds. Length of day and night. Direction of sunrise and sunset. Altitude of the sun. Altitude of the Pole Star.

Determination of Latitude.

2)666(.333

×2

666

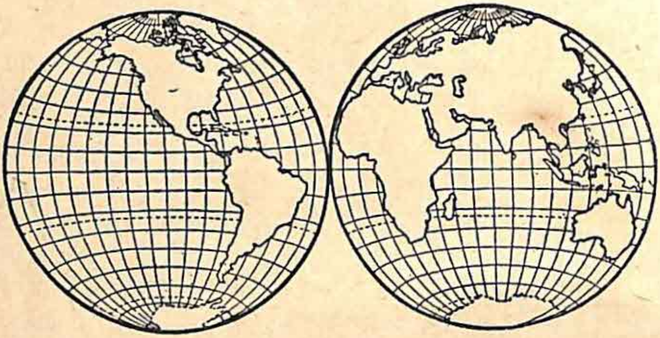
CHAPTER I

STUDY OF THE WORLD AS A WHOLE FROM THE GLOBE

The globe in your school is just a small model of the big earth on which we live. Before we start our study of the globe to get an idea of the way in which the surface of the earth is divided into land and sea, mountains and flat plains, lakes and islands, we must know how much larger the real earth is than the model of it that we see on the teacher's table. In all the maps that we use, a **Scale** is generally given to show the relation between distances measured on the map and corresponding distances measured on the surface of the earth. But no such scale is usually given on globes, so we must find out the scale for ourselves. Supposing the globe in our school is one having a diameter of 1 ft., and knowing the diameter of the earth to be about 8,000 miles, we can say that 1 in. of our globe represents $\frac{8,000}{12}$ or 666 miles of the earth. Thus, whenever we study the world from the globe we would do well to remember that 1 in. on the surface of our globe represents twice the distance from Patna to Calcutta.

The surface of the earth is very uneven, there are hills and mountains, tablelands and valleys, but we find that the surface of our school globe is quite smooth. Take the case of Mount Everest, the highest mountain on the surface of the earth, $5\frac{1}{2}$ miles high, and find out how high it would be on the surface of our globe. A simple calculation shows us that Mount Everest will have to be represented by a height of less than $\frac{1}{100}$ in. on the surface of our 12 in. globe. This means less than half the thickness of the paper on which this book is printed. So you see the reason why the heights and depths on the surface of the earth cannot be represented on our globe. There are many circles drawn on the surface of the globe. These are for the purpose of showing direction. One set of these circles pass through the poles and are called **Meridians**

of Longitude. Another set of circles run round the globe from side to side and are parallel to one another. These are called **Parallels of Latitude.** The middle line that runs right round the globe half-way between the North and South Poles is called the **Equator.**



THE WORLD

The diagram on the right-hand side represents the Eastern hemisphere, while that on the left represents the Western hemisphere. Try and name the continents marked in each diagram.

Continents and Oceans. Let us now learn the names of the various land masses and oceans that are on the surface of the earth. You all know by this time that the continent of which our country forms a part is called **Asia.** It is the largest of all continents. To the south-west of it lies the second largest continent, **Africa.** Turn the globe round and you will see the third largest continent, **North America.** Joined to it by a narrow strip of land is **South America,** the continent that is farthest from us. **Europe,** which is really the western part of Asia, is only one-fifth the size of the latter. The only land mass that we have not yet taken count of is **Australia** which may be regarded as the smallest continent or the largest island. It lies to the south-east of Asia.

The continents or great land masses are separated from one another by oceans. The **Pacific Ocean** separates Asia and Australia from the Americas. The **Atlantic Ocean** separates Europe and Africa from the Americas. The **Indian Ocean** lies to the south of

Asia; it separates Africa from Australia. The **Arctic** and **Antarctic Oceans** are round the North and the South Poles respectively.

The surface of the earth is 197,000,000 square miles in area; of this 57,000,000 square miles is land. Thus there is two and a half times as much water surface as land surface on the earth.

Relief of the Globe. The earth was a very hot, soft body at one time. Gradually it lost heat and, in cooling, the outer surface or crust became hard. The shrinking in size of the cooling earth caused some parts of its crust to fold up. These huge wrinkles or folds on the surface of the earth have formed **Fold Mountains**. One such long fold extends north and south throughout the whole length of the western part of the Americas. Another long fold, with many branches, extends east and west across Europe and Asia. When these great folds were being formed, there were certain big blocks of crust left between them, which we call plateaux. The softer portions of the earth's crust were folded against the plateaux, just as one can cause folds to appear on a tablecloth by forcing it against a book lying on the table. The Himalayas have thus been formed by pressure against the plateau of Tibet. Rivers, by depositing mud, have formed fertile valleys between the folds of the mountains and also between the fold mountains and the plateaux.

QUESTIONS[1]

1. Why are all the lines of latitude parallel ?

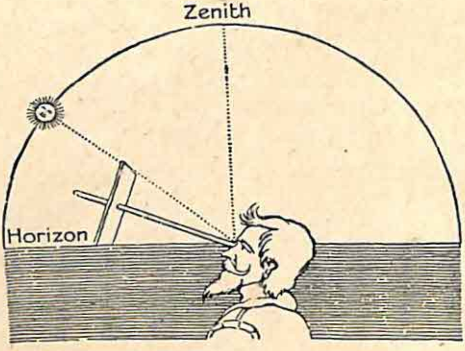
CHAPTER II

DETERMINATION OF ALTITUDE

THE **Altitude** of a star is the angle that a line drawn to the star from the eye of the observer makes with the horizon. Thus if A denotes the position of an observer on the surface of the earth, the point Z vertically overhead is called his **Zenith** and AH, which

---

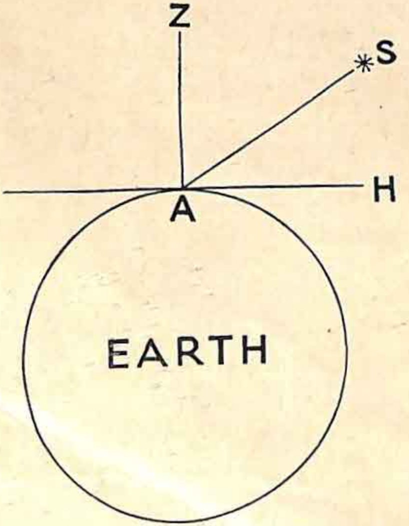
[1] The questions given in this book are intended for discussion in the class.

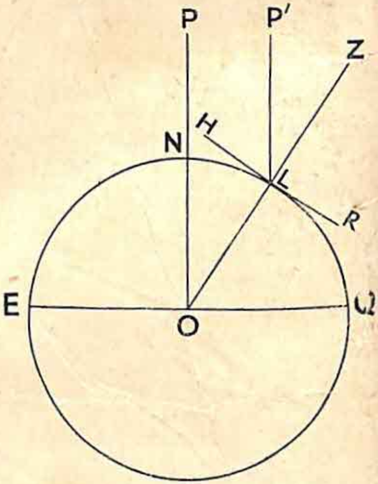


FINDING ALTITUDE OF THE SUN
This picture shows how in the olden days a man sighted the angle between the sun and the horizon. The cross piece was made to slide on the rod.

is at right angles to AZ, the line joining A and the zenith, is the **Horizon** at A. If the observer sees the star at S, then the angle HAS is the altitude of the star above the horizon.

This method of finding the altitude of a star enables us to know the latitude of a place. If P be the direction of the Pole Star vertically above the North Pole, the observer at L will see the Pole Star in the direction LP′, parallel to PN. This happens because the stars are at such great distances from us that all rays from a particular star are parallel to one another so far as the earth is concerned.



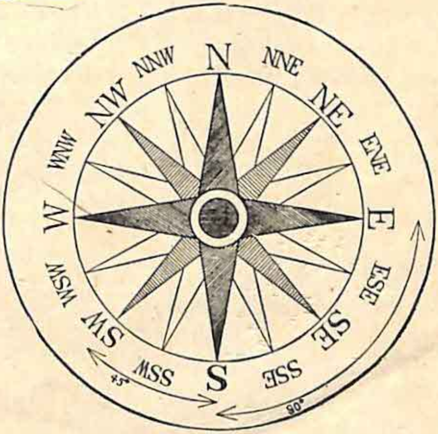


Join O, the centre of the earth, to L, and produce it to Z, the zenith of the observer. Draw a straight line HLR perpendicular to OL to represent the horizon at L. Now P′L and PO are parallel, and OZ meets them, so the exterior angle P′LZ=the interior opposite angle POZ. The angles HLZ and NOQ are equal, both being right angles. If we take away the equal angles P′LZ and NOL from each, the remaining angles P′LH and LOQ will be equal. Now the angle P′LH is the altitude of the Pole Star at L and the angle LOQ represents the angular distance of the place L from the equator EQ, in other words, the angle LOQ is the latitude of the place L. So, if we can find out the altitude of the Pole Star at any place, we shall know the latitude of the place.

CHAPTER III

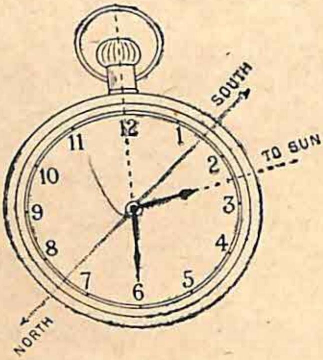
METHODS OF FINDING THE NORTH POINT

THERE are various ways of finding the north and south directions. The teacher will show you the **Compass** in which you will find the needle always coming to rest pointing north and south. You will learn later that the compass needle does not point to the true north but to a point which is not far from it. However, we may consider the compass needle to point north and south for all ordinary purposes.



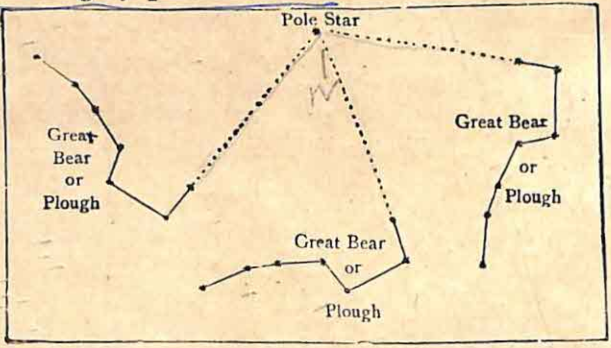
THE POINTS OF THE COMPASS

Another rough method of finding direction is to hold a watch, keeping correct time, face upwards with the hour hand pointing in the direction of the sun. The line bisecting the angle formed by the hour hand and the imaginary line joining the centre of the watch dial to the figure 12 points to the south. So, if this bisector is produced it will show north. A third method of finding the north is from the direction of the Pole Star. The Pole Star can easily be found out in the sky if we can recognize the well-known group of seven stars called *Saptarshi* or the Great Bear. The relative position of these seven stars is shown in the figure below.



Of these seven stars there are two which, when joined by an imaginary line, always point to a prominent star in the north and are therefore known as the *pointers*. The star which is found by drawing an imaginary line through the pointers is the Pole Star. Before the discovery of the compass, sailors used to guide their course on sea with the help of the Pole Star.

A rough method of finding north is to stand facing the rising sun: as the sun rises on the east, our left hand will roughly point to north.



THE POLE STAR AND THE GREAT BEAR

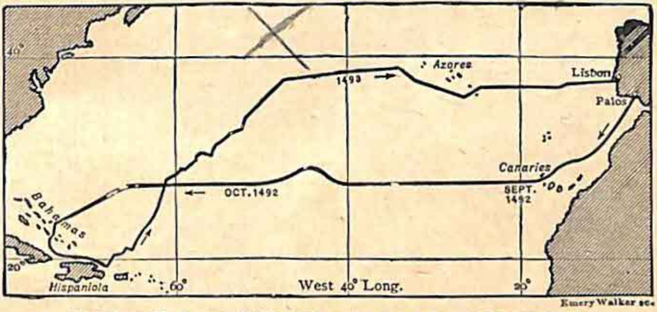
The Pole Star (at the top) remains fixed; while the 'Great Bear' or '*Saptarshi*' group of stars revolves round it. Here you see their positions in relation to the Pole Star at intervals of four hours.

A stick set upright on the ground throws a shadow north and south when the sun shines upon it at noon. The time of noon is to be found out not from a watch, but by noting the moment when the shadow of the stick on the ground is shortest.

CHAPTER IV

VOYAGES OF EARLY NAVIGATORS AND EXPLORERS

THE **Phoenicians** were the great trading people of early days. They sailed in small boats of simple construction with the help of wind, currents and the use of oars. They lived on the eastern side of the Mediterranean Sea (modern Syria), and had a fair knowledge of the coasts of Asia Minor, Southern Europe and Northern Africa. You have read in your history book that they even reached England in search of tin.



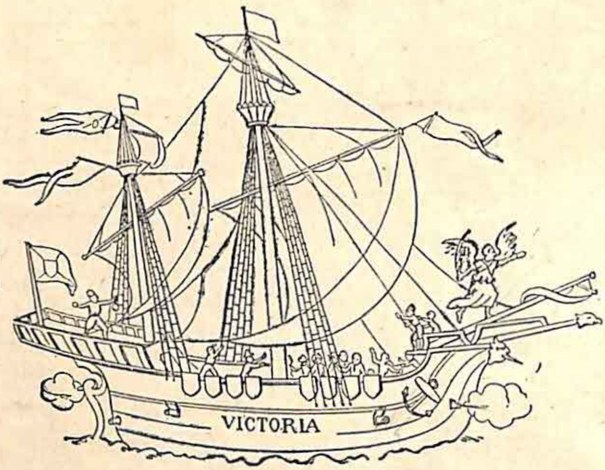
Emery Walker sc.

MAP OF THE ROUTE TAKEN BY COLUMBUS

Discovery of America. There was a very profitable trade in spices between south-eastern Asia and Europe in the Middle Ages. This trade was mainly in the hands of Italian merchants. Other European nations were jealous and were trying to find a sea route to Asia. **Christopher Columbus,** an Italian by birth, sailed westward from Spain in 1492, hoping to reach Eastern Asia by going round the globe. He reached America instead, thereby discovering a new continent lying to the west of Europe across the Atlantic Ocean.

THE FLAGSHIP OF COLUMBUS

A few years later, a Portuguese, **Ferdinand Magellan,** also sailing from Spain, reached the southern end of South America and



THE FIRST SHIP THAT SAILED ROUND THE WORLD

Magellan's *Victoria*, from Hulsius's *Collection of Voyages*, 1602.

passed through the straits which now bear his name. He was the first European to reach the Pacific Ocean. He died on the way but his followers returned to Spain after passing round the Cape of Good Hope. This was the first complete voyage round the world.

The **Cape Route to India.** In 1498, **Vasco da Gama,** a Portuguese, first came to Calicut in India from Portugal by rounding the southern end of Africa. This was the first discovery of a sea route from Europe to Asia.

Australia was first discovered by Dutch explorers.

Note that the great era of discovery and exploration of unknown parts of the world began towards the end of the fifteenth century.

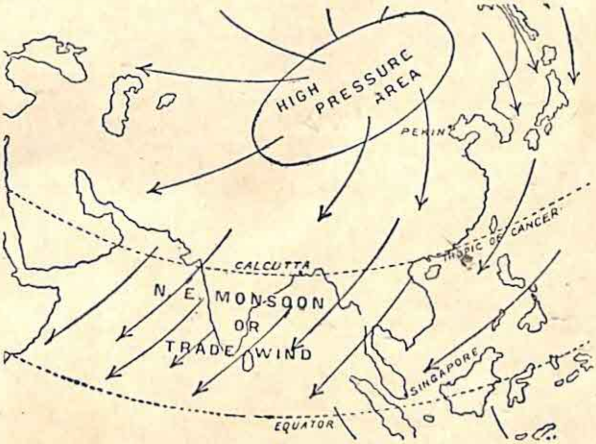
VASCO DA GAMA

From a contemporary portrait.

CHAPTER V

MONSOONS, SEASONS, LATITUDE AND LONGITUDE

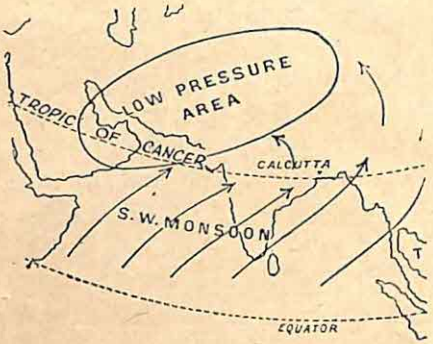
THE **Monsoon.** The word *monsoon* comes from an Arabic word *mausim*, meaning season. The monsoons are so called because they are seasonal winds, i.e. they blow in different directions in different seasons. They are the most important factors in the climate of India.



WINTER MONSOON

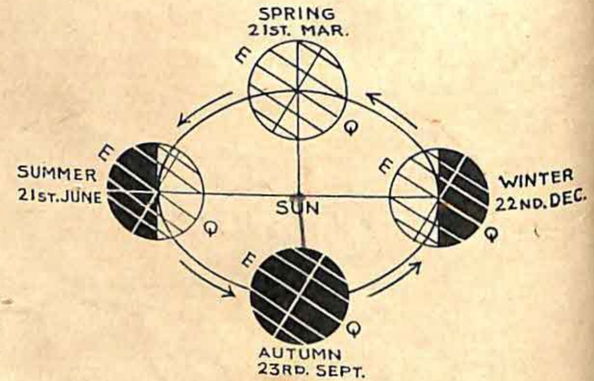
In the winter months, when the sun goes to the south of the Equator, the centre of Northern Asia becomes extremely cold. These parts are entirely shut off from the warming influence of the oceans by lofty mountain ranges and are exposed to cold winds from the Siberian Plains. Owing to intense cold, a high pressure area is formed in the heart of Asia from which cold dry winds blow outwards in a clockwise direction. These winds are entirely cut off by the lofty Himalayas and do not reach India at all. In summer, the land to the north of the Arabian Sea gets strongly heated and is a region of low pressure. Moist winds from the Indian Ocean start blowing towards this low pressure area in an anti-clockwise direction. As its direction in the Arabian Sea and the Bay of

Bengal is from the south-west, it is called the **South-West Monsoon.** These winds bring about 90 per cent of all the rain that falls in India.



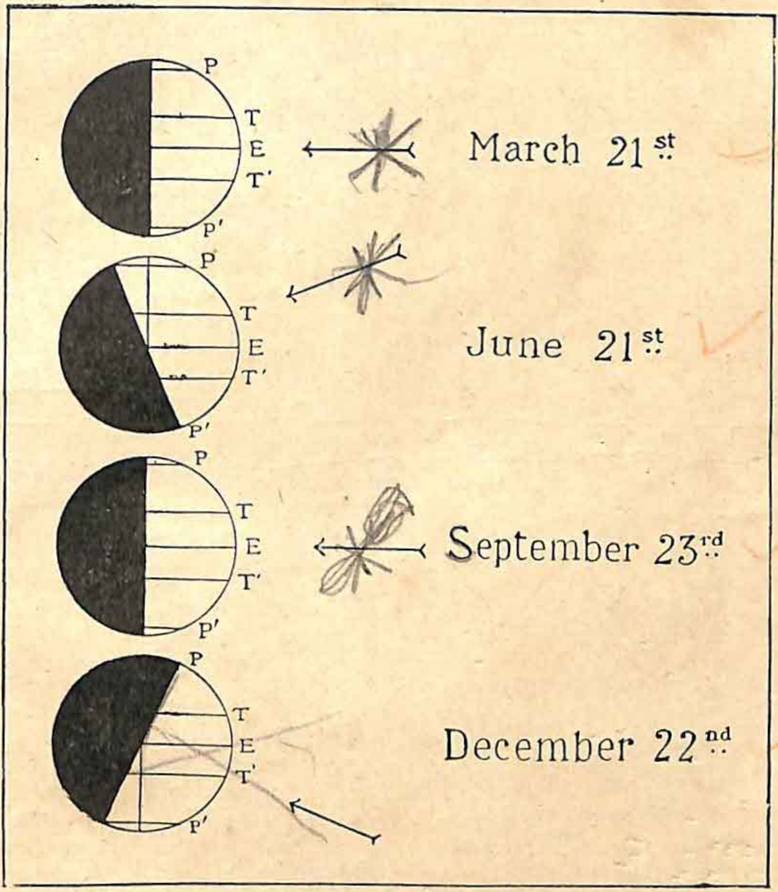
SUMMER MONSOON

The Seasons. Variations in the Length of Day and Night. We have all noticed that there are great differences between different parts of the year. It is very hot and sunny in summer, and cold and dry in winter. We have long days and short nights in summer, but in winter, the days are shorter and the nights longer. That is why there is not much time left for play in winter after school is over. We should know what brings about this change of seasons in different parts of the year. During half the year the northern hemisphere is tilted or turned towards the sun and the southern hemisphere is tilted away from it. During this time, the northern hemisphere, where we live, has longer and hotter days and so receives more heat and light than the southern hemisphere. We have our summer at this time, and the people living on the south of the Equator are having their winter. During the other half of the year, the northern hemisphere is tilted away from the sun and the southern hemisphere is tilted towards it. People living in the southern hemisphere then have their summer and we have our winter.



THE CAUSE OF SEASONS

On the Equator, days and nights are always equal and there are no seasons. Midway between the summer and winter positions of



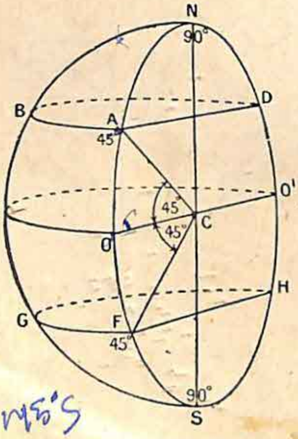
DAY AND NIGHT AT DIFFERENT SEASONS

The arrows show the direction of the sun's rays falling on the earth at different seasons. The line E represents the equator. P and P′ are the North and South polar circles, whilst T and T′ represent the Northern and Southern Tropics. On March 21 the sun is directly over the Equator and its rays reach both poles. On June 21 it is overhead the Northern tropic, its rays do not reach places in the South polar circle. September 23 finds it directly overhead at the Equator again, whilst on December 22 it is overhead at the Southern tropic and so its rays do not reach places within the North polar circle.

the earth, i.e. in autumn and in spring, neither the northern hemisphere nor the southern hemisphere is turned towards the sun. So these are intermediate seasons, neither markedly hot nor cold. Of course, when it is spring in the northern hemisphere, it is autumn in the southern hemisphere and conversely.

In Patna, the longest day in mid-summer is about 13½ hours; the shortest day in mid-winter is about 10½ hours.

Latitude and Longitude. In order to know the position of a place on the earth's surface, we must have two fixed lines on the surface of the globe to which to refer. One such fixed line is the Equator which is an imaginary line lying midway on the earth's surface equally distant from the two poles. The other fixed line is a half-circle passing through Greenwich and reaching the two poles. This is called the **Prime Meridian.** The distance of the North or the South Pole from the Equator is one-fourth of the earth's circumference. As the earth may be supposed to be a sphere, one-fourth of its circumference is one-fourth of 360° or 90°. If the arc equator-pole is divided into ninety equal parts, each such part will subtend an angle of 1° at the centre of the earth.

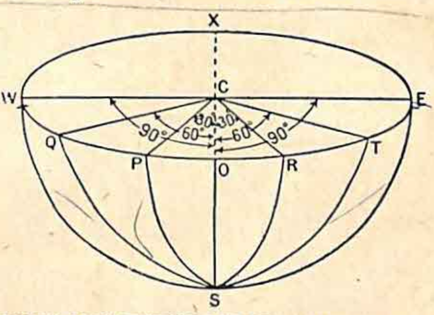


HOW LATITUDE IS
MEASURED IN DEGREES

Parallels of Latitude. If through each of these ninety points of division circles be drawn on the surface of the globe, parallel to the Equator, we shall have parallels of latitude drawn at an interval of 1°. These circles become smaller and smaller as they approach the poles and serve to indicate the distance of any place, measured in degrees, north or south of the Equator. The latitude of the Equator is 0°, that of the North Pole is 90° N. and of the South Pole 90° S. Thus, latitude is the (angular) distance of any place on the surface of the earth, measured in degrees from the Equator. The latitude of Patna is 25° 37′ North.

Meridians of Longitude. Let us imagine the Equator to be divided into 180 equal parts, each equal to 1°, east of the Prime

Meridian, and also into 180 equal parts, each equal to 1°, west of the Prime Meridian. Also suppose a half-circle to pass through each of these points of division and reach the poles. Each of these half-circles will be a Meridian of Longitude. Thus the longitude of a place on the earth's surface is its (angular) distance, east or west of the Prime Meridian, measured in degrees. The longitude of the Prime Meridian is zero degrees. That of Patna is 85° 13′ East. What is the greatest possible longitude?



HOW LONGITUDE IS MEASURED IN DEGREES

The Tropics. You must have noticed that the sun rises much higher in the sky in summer than it does in winter. Though the sun is never right overhead at Patna, it is almost so at noon on June 21. This is the longest day of our year. In winter, the sun at mid-day does not stand very high in the heavens. It is at its lowest position on December 22, which is our shortest day. (Why is Christmas called *Bara Din* in India?)

If you look at the school globe you will find two circles parallel to the Equator at about a quarter of the distance (23½°) between the Equator and the Poles. These circles are called the Tropics. The one to the north of the Equator is called the **Tropic of Cancer,** and the other, to the south of the Equator, is called the **Tropic[1] of Capricorn.**

Parallel to the Equator and the Tropics, there are two other circles marked prominently on the globe. These are called the **Arctic** and **Antarctic Circles** respectively. They are as far from the Poles as the Tropics are from the Equator. (What is the distance of the Arctic Circle from the Equator in degrees?)

On June 21, the sun is overhead at all places on the Tropic of Cancer. Its rays reach the North Pole, but they do not reach places within the Antarctic Circle. On September 23, the sun is overhead at the Equator. Its rays reach both the Poles. On

[1] The word *tropic* comes from a Greek word meaning to turn.

December 22, the sun is overhead at the Tropic of Capricorn. Its rays then do not reach places within the Arctic Circle. On March 21, the sun is again overhead at the Equator and its rays reach both the Poles.

QUESTIONS

1. When it is day in Patna, what parts of the world are having night? Answer this question with the help of the globe.
2. What effect have the Himalayas on the direction of the monsoon winds?

CHAPTER VI

CLIMATE

THE **Weather** of a place varies from day to day. It may be sunny today, but cloudy tomorrow. By **Climate** is meant the average state of the weather of any place. Thus the climate of a place may be warm or cool, hot or cold, dry or damp. If the climate is neither very hot nor very cold, it is called **Mild, Equable** or **Temperate.** If a place is very hot in summer and very cold in winter, or very hot during the day and very cold at night, it is said to have an **Extreme** climate. As such a climate is generally found in the interiors of large continents, it is also known as a **Continental** climate.

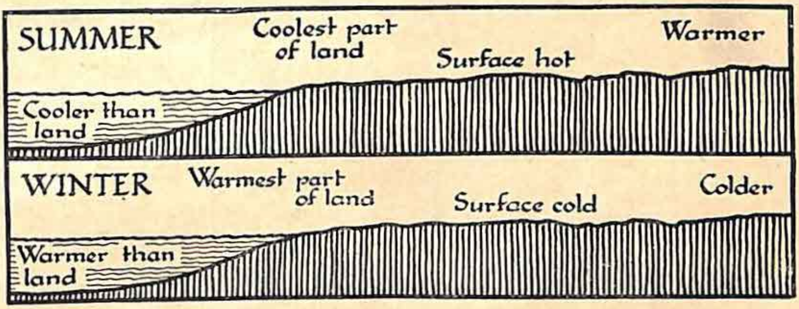
Factors of Climate. The chief factors on which the climate of a place depends are the following :—

(1) **Latitude.** The farther a place is from the Equator, the cooler it is. Thus England is cooler than India.

(2) **Altitude,** or the height of a place above the sea-level. The higher a place, the cooler it is. Agra and Darjeeling are about equally distant from the Equator, both having nearly the same latitude. The temperature of Darjeeling in June is 60°, that of Agra 94°, Darjeeling being 6,800 ft. higher than Agra.

(3) **Relative Position of Land and Sea.** Water requires much more heat than land to raise its temperature. During summer, sea and land in any area are receiving equal quantities of heat from the sun. This raises the temperature of the sea less than that of the

land. In summer, therefore, the temperature of the land is higher than that of the neighbouring sea. The cool sea lowers the temperature of the neighbouring land. It thus happens that places near the sea are cooler than places far from it. In winter, the land loses heat and gets cooler more rapidly than the sea. So the warm sea makes the neighbouring land warmer in winter. The general effect of the sea is then to lower the temperature of the land near it in summer and to raise it in winter. There is not much variation of temperature in land near the sea. At Calicut the difference between summer and winter temperatures is only 6°; at Delhi it is 34·3°. Places near the sea, where there are no big differences between summer and winter temperatures, are said to have a **Maritime, Insular** or **Oceanic** type of climate. (What name is given to the opposite type of climate?)

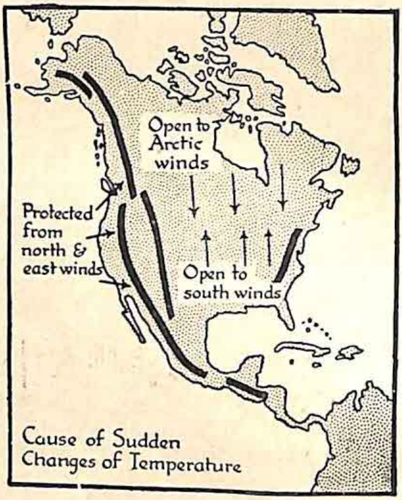


EFFECTS OF THE SEA ON TEMPERATURE

(4) **Prevailing Winds.** The climate of a place also depends on the direction and nature of the prevailing winds. Winds blowing from northern regions are cooler than those blowing from southern regions. Even when a country is situated near the sea, if the direction of the prevailing wind be from land to sea it will not have a maritime type of climate. (Why do west winds always make Patna cooler in winter and warmer in summer? Why have east winds an exactly opposite effect on the climate of Patna?)

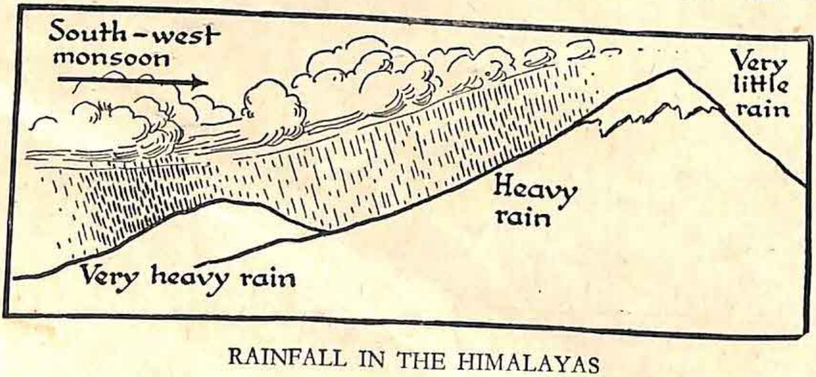
(5) **Ocean Currents.** Shores that are washed by warm ocean currents are heated by the warm wind blowing over the sea. But shores by which cold currents flow have a cold climate. Ocean

currents can only influence the climate of a country when the prevailing winds blow from the sea landwards. The warm Gulf Stream makes the climate of Western Europe warmer than it would have been otherwise.


Open to Arctic winds
Protected from north & east winds
Open to south winds
Cause of Sudden Changes of Temperature

CAUSE OF SUDDEN CHANGES OF TEMPERATURE IN THE UNITED STATES

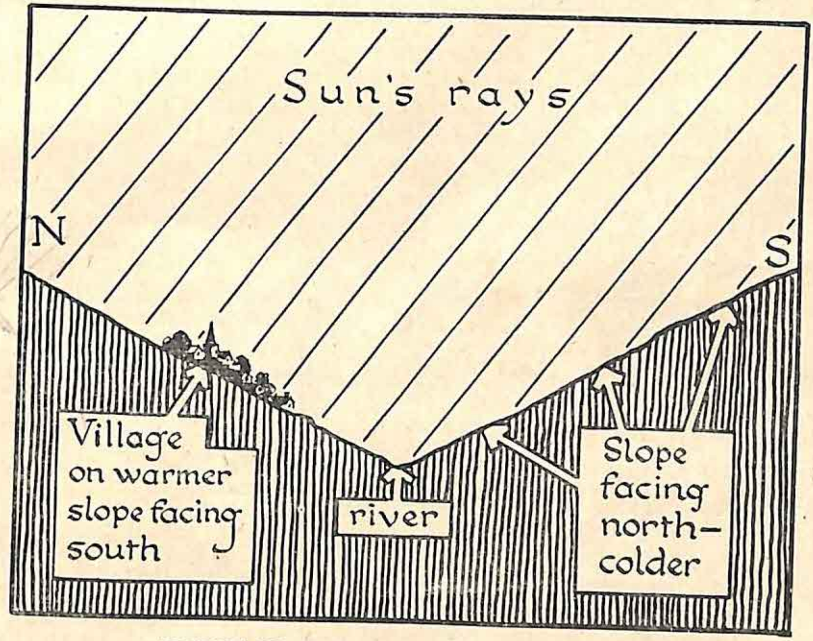
(6) **Position of Mountains.** Some countries are protected from hot or cold winds by high mountain ranges. The Himalayas protect India from the cold winds of Central Asia. In North



RAINFALL IN THE HIMALAYAS

America where the main mountain chains run north and south, the whole of the continent is subject to sudden changes of temperature. A warm wind coming from the south may be followed by cold winds from the Arctic regions and cause a rapid fall of temperature.

Mountains may also prevent rain-bearing winds from entering a country lying on their leeward side and make it rainless. The Himalayas prevent the monsoon winds from the Bay of Bengal from entering into Tibet, and make it a rainless country. The Western Ghats check the Arabian Sea monsoon and the Deccan has a poor rainfall. The 'dry zone' of Burma, being in the rain-shadow of the Arakan Yomas, gets a smaller amount of rainfall than any other part of the Province.

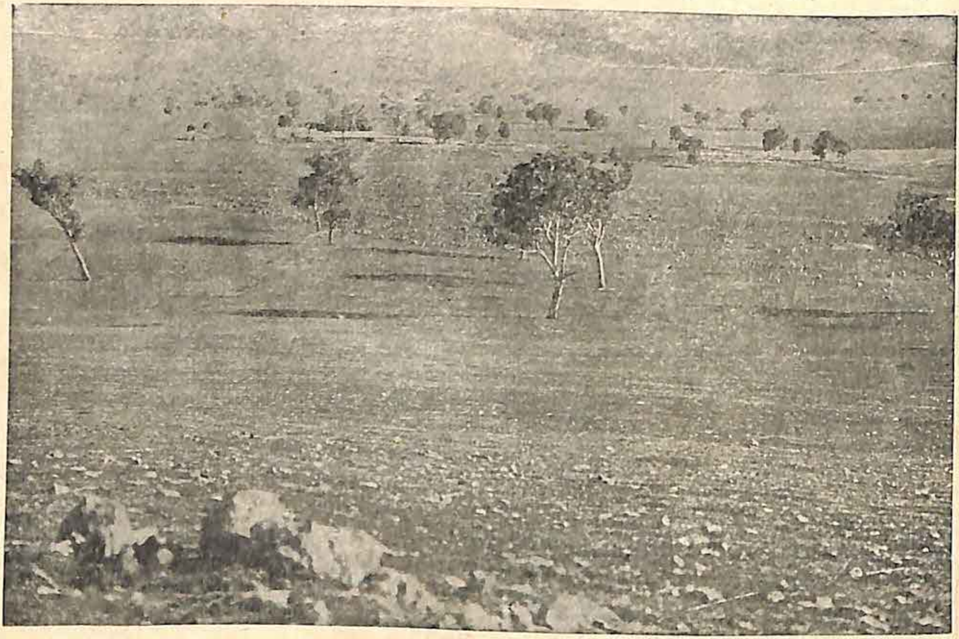

Sun's rays
N
S
Village on warmer slope facing south
river
Slope facing north—colder

EFFECT OF NORTH AND SOUTH SLOPES

(7) **Slope of Land.** Lands which slope towards the Equator receive the sun's rays less obliquely than lands sloping towards the

4. The **Temperate Monsoon** type of climate is similar to the above, but cooler. The summers are not so hot, the winters are colder. Rain falls mainly in summer. China has a climate of this kind. The summers are as hot as our September, the winters are as cold as our hill stations in January.

5. The **Hot Desert** type of climate is found generally in countries lying on the Tropics. Rainfall is very small; the days are very hot, the nights cold. The summers are much hotter than they are in Northern India, the winter months are slightly cooler than they are here. Arabia and Western Rajputana (Thar) have got this kind of climate.



SAVANNA LANDSCAPE

These savanna or grassland regions are subject to long periods of drought. In some parts grass grows to a height of 8 or 10 feet; thorny shrubs are very common; trees grow in some parts, whilst others remain completely bare.

6. The **Temperate Desert** type of climate is found beyond the Tropics in the interiors of continents. Rainfall is small as in

tropical deserts, but the winters are very cold, and snow lies unmelted on the ground for some months of the year. The summers are nearly as cold as our winters.

A large part of Central Asia has this type of climate.

7. The **Mediterranean** or **Warm Temperate** type of climate. In latitudes 35° to 45° N. and 30° to 40° S. on the *western* side of continents there are regions where westerly winds blow from the sea in winter and easterly land winds blow in summer. Consequently, such regions have cool moist winters and warm dry summers. This **Winter Rain** climate is found in Southern Europe bordering the Mediterranean Sea, hence the name. Kashmir also has this type of climate. The summers are as warm as March in Patna, the winters are as cold as are the coldest parts of the Punjab in January.

8. The climate of the **Westerly Winds.** North[1] of the region of Mediterranean climate and in the western parts of continents are regions where westerly winds blow from the sea throughout the year. Hence there is no rainy season, but rain falls all the year round. The summers are as cold as the coldest month in Patna, the winters are much colder and there are snowfalls. England has this type of climate.

9. Interiors of continents in the region where westerly winds blow throughout the year have a **Temperate Continental** type of climate. Being far from the sea, rainfall is small, so only grass can grow. Hence this type of climate is also called the **Continental Grassland** climate. This is an extreme type of climate as the influence of the sea does not penetrate so far inland. The summers are warmer and the winters colder than they are in England. The temperature is below the freezing point of water for some months. Rain falls mainly in summer. Eastern Europe has this type of climate.

10. The **Arctic** type of climate is found within the Arctic and Antarctic Circles. The winters are very long and intensely cold. There is a very short summer, lasting for about two months, when ice melts.

1497

910
Gho

---

[1] South in the southern hemisphere.

Poles. In the northern hemisphere, the southern sides of hills are warmer than the northern sides. This is one of the reasons why the southern slopes of the Himalayas are densely forested while the northern slopes are bare of vegetation.

(8) **Soil.** Wet and marshy lands make the air damp and cold. Eastern and Southern Bengal are cooler than the United Provinces or the Punjab. The effect of draining a marsh is to raise its temperature. Sand or stone is heated and cooled much more quickly than ordinary clay soil. This is the reason why Gaya is hotter than Patna in summer and colder in winter. All sandy deserts are hot during the day and cold at night.

(9) **Vegetation.** The part of a country covered with forests has a much milder climate than it otherwise would have. The cutting down of forests has made large areas in Chota Nagpur hot and dry. Equatorial regions, covered with luxuriant vegetation, are cooler than places in the tropics where there are no forests.

(10) **Rainfall.** A heavy fall of rain makes a place damp and such an area can never be very hot in summer, nor very cold in winter. In Bengal, the summers are cooler and the winters milder than they are at Bihar, because of the heavier fall of rain in the lower Ganges Valley. July is the hottest month all over the northern hemisphere, but in India it is June. Temperature does not rise higher in July because the monsoon bursts by the end of June.

Some of the important types of climate to be met with in different parts of the world are described below:

1. **Equatorial** climate. This is a **Hot and Damp** climate found for about 15° on either side of the Equator. Temperature is uniformly high[1] throughout the year, hence there are no seasons. Heavy rain falls, and the yearly range of temperature is only 5°. Such a climate is favourable to the growth of dense forests.

2. The **Tropical, Savanna** or **Sudan** type of climate is found from 15° to 25° in the north and south of the equatorial regions. The total rainfall is small, and most of the **Rain** falls in **Summer**. The range of temperature, although greater than in the equatorial regions, is still not great enough to have a cool winter. The

---

[1] The equatorial regions have an average temperature comparable to that of Patna in October. So, contrary to popular belief, they are not very hot.

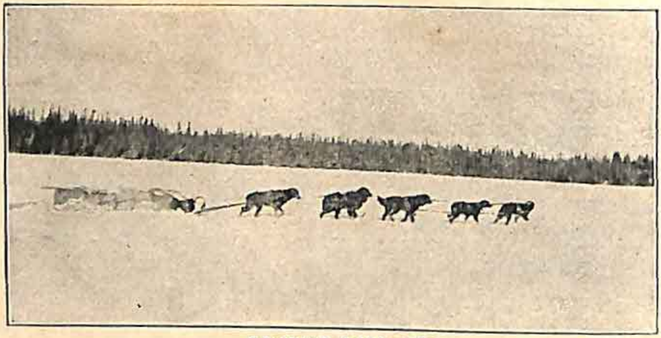
summers are as hot as our June, the winters are as cool as our February. This type of climate is suitable to the growth of grass, but not of big trees or forests.

3. The **Hot Monsoon** type of climate is very similar to the above, but rainfall and range of temperature are greater. In India, where we have this type of climate, the winters are cool and dry; the summers are hot and dry till June, and then with the coming of the monsoon, become hot and damp.

AN EQUATORIAL FOREST

Notice the density of the vegetation. Great trees grow closely together whilst the undergrowth beneath is thick and swampy.

It should be remembered that climate changes gradually from place to place and there is no sharp line of separation between the different climatic regions. In the following table, the temperatures and rainfalls of places in different parts of India are given for the sake of comparison.



ARCTIC SCENERY

Notice the stunted trees in the background. The sledges, which are the only vehicles of transport, are drawn by dogs.

AVERAGE MONTHLY TEMPERATURES

	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
Lower Ganges Valley : Calcutta	65	70	79	85	86	84	83	82	83	80	72	65
Middle Ganges Valley : Patna	61	65	77	86	88	86	84	83	83	80	70	62
Upper Ganges Valley : Delhi	58	62	74	86	92	92	86	85	84	79	68	60
Upper Indus Valley : Lahore	53	57	69	81	89	93	89	87	85	76	63	55
Lower Indus Valley : Jacobabad	57	62	75	86	94	98	95	92	89	79	68	59
Thar Desert : Bikaner	59	64	77	88	94	95	90	87	87	82	71	61
Central India : Nagpur	69	74	82	91	95	87	80	79	80	78	72	67
Hill Station : Simla	39	41	52	59	66	67	64	63	61	57	50	43
West Coast : Bombay	75	75	78	82	85	82	80	79	79	81	79	76
East Coast : Madras	75	77	80	84	89	88	86	85	84	81	78	76
Burma Coast : Rangoon	75	77	81	85	82	80	79	79	79	80	78	76

AVERAGE MONTHLY AND ANNUAL RAINFALL IN INCHES

	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	ANNUAL
Lower Ganges Valley: Calcutta ..	·29	1·02	1·14	1·54	5·6	11·04	12·3	12·7	10·4	3·87	·62	·31	60·8
Middle Ganges Valley: Patna ..	·72	·53	·35	·3	1·7	7·76	11·4	10·7	7·8	2·9	·2	·14	44·5
Upper Ganges Valley: Delhi ..	1·02	·61	·67	·35	·71	3·1	8·4	7·4	4·4	·4	·1	·4	27·7
Upper Indus Valley: Lahore ..	·87	1·13	·9	·5	·8	1·8	6·6	4·9	2·1	·4	·1	·4	20·7
Lower Indus Valley: Jacobabad	·28	·27	·25	·17	·15	·1	1·2	1·2	·2	0	·1	·1	4·1
Thar Desert: Bikaner ..	·38	·24	·2	·1	·8	1·6	3·3	3·1	1	0	0	·2	11·2
Central India: Nagpur ..	·58	·42	·57	·46	·68	8·4	13·5	9·8	8·1	2·1	·5	·4	45·6
Hill Station: Simla ..	3·2	3	2·5	2·3	3·7	7·8	18·4	17·9	6·1	1·2	·4	1·2	68
West Coast: Bombay ..	·1	0	0	0	·5	20·6	24·6	15	11	1·8	·4	0	74
East Coast: Madras ..	·8	·3	·4	·6	2	2	3·8	4·7	4·8	11	13·3	5·2	49
Burma Coast: Rangoon ..	·1	·2	·2	1·7	11·7	18·8	21·3	19·6	15·9	7·1	2·5	·1	99

The various types of climate can be classified according to rainfall as follows :—

Rain at all seasons	Equatorial Westerly
Rain in summer	Monsoon (hot and temperate) Temperate Continental Tropical
Rain in winter	Mediterranean
Very little rain	Hot Deserts Temperate Deserts

Note that three types of climate are to be found within the Tropics:

Hot+dry : **Desert.**

Hot+wet throughout the year : **Equatorial.**

Hot+wet for half the year and dry for the other half: **Monsoon.**

QUESTIONS

1. In what respects is the climate of India suitable for agriculture? What are the chief defects of this climate? In what way is it possible to remedy this climatic defect?
2. Point out on the map rain-shadow areas in (*a*) British India, (*b*) Burma, (*c*) Great Britain.
3. What places have the greatest ranges of temperature? the least?
4. What is the difference between degrees of latitude and degrees of temperature?
5. What two factors of climate are important in giving suitable conditions for the growth of equatorial forests? Why does not the equatorial forest cover plateaux and mountains near the Equator?
6. What is meant by the saying 'Night is the winter of lands near the Equator?'
7. Which is worse for a country—to have too much or too little rain?

CHAPTER VII

AGRICULTURAL LAND

THE upper layer of the earth's crust in which plants grow is called **Soil.** The earth's crust is always exposed to air and water which cause it to crumble. This process is known as **Weathering.** The chief causes of weathering are rain, rivers, wind, the sea, the sun's heat, frost and air. Let us see how these act.

Rain. The carbonic acid gas dissolved in rain water can act on some portions of rocks and dissolve them, thus causing the remaining portions to crumble.

Rivers. Running water can break off and carry away particles of rock. The broken pieces of rock are rubbed against one another and rolled along the bed of the stream until they are worn to form smooth, round pebbles and finally ground to a fine powder which forms sand.

Wind wears down rocks by dashing sand particles against their surface. This takes place mainly in dry desert climates.

The **Sea** waves dash against the shore and break down the rocks forming the coast.

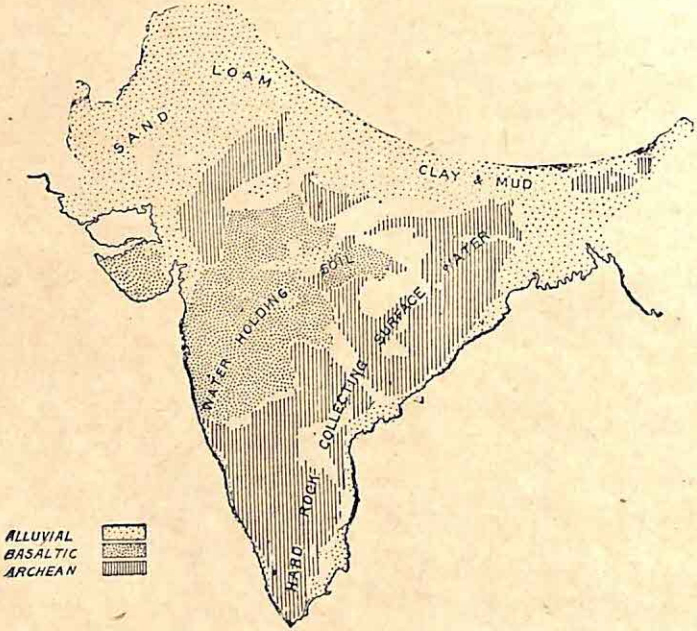
The **Sun's Heat.** Rocks are heated by the sun during the day and expand. At night they become cooled and contract. This alternate heating and cooling, expanding and contracting, gradually cracks them. (What happens when a lump of ice is dropped into a heated glass tumbler or when cold water is sprinkled on a hot lamp chimney ?) Rain water sinks into these cracks and, in cold climates, is frozen into ice. As ice occupies a larger space than water from which it is formed, the rocks are shattered by the freezing of water during a **Frost.**

Air. You must have noticed that a piece of iron left exposed to air gradually crumbles to a brown powder. This powder is called rust, and is formed by the chemical action of the moisture in the air on the iron. In much the same way many rocks crumble to pieces on being exposed to moist air for a long time.

In addition to the particles of sand and clay obtained from the crumbling of rocks, the average soil also contains remains of plants and animals which give to soil its familiar black colour. Unless the soil has been brought from some other place by the action of moving air (wind) or flowing water, it contains the same things as are present in the solid rock below.

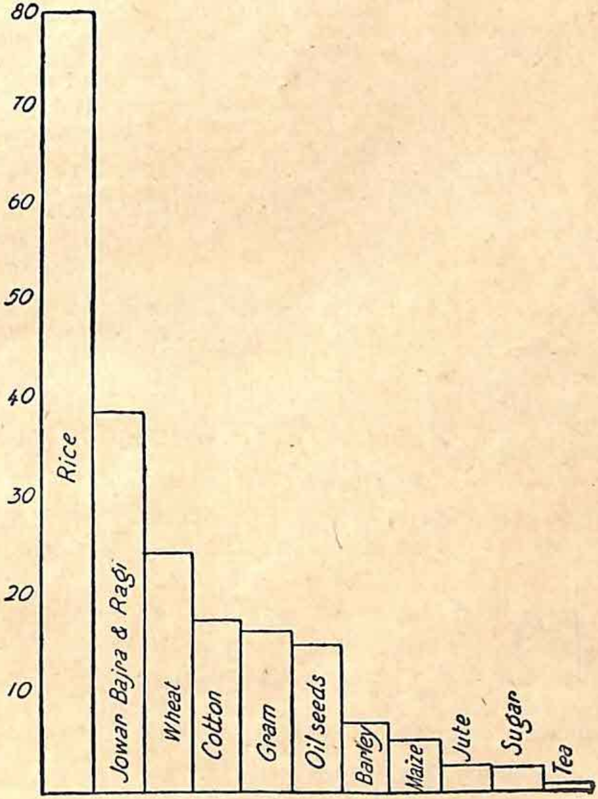
Alluvial Soils are those that have been deposited by running water in which the particles of soil were suspended or dissolved. This kind of soil, consisting of materials brought together from many different kinds of rocks, contains all the necessary plant-foods and is very fertile. The Deltas of the Deccan rivers, the Mahanadi, the Godavari, the Kistna, and the Cauvery, are also fertile for the same reason. In the Deccan, two different kinds of soil are found: The north-western part of the Deccan plateau has a dark, heavy soil which retains moisture for a long time, and is called **Black Cotton Soil** as it has been found to be very suitable for cotton growing. In the south-eastern part of the Deccan plateau, the soil is of a red colour and is known as **Laterite.** These soils are both described fully in Chapter XV, page 68.

Effect of Rainfall on Agriculture. Rich soil alone is not sufficient for the growth of crops. Water must be supplied by rain or, where rainfall is insufficient, by irrigation. Where rainfall is poor, only grass can be grown. Unless water can be supplied, no agriculture is attempted in such regions, but sheep and goats can be reared. However fertile the soil may be, a rainless region is bound to be a desert. Thus it is that with the help of irrigation cultivation is very successful in some naturally fertile desert areas like Sind. The amount of rainfall also determines the nature of crops grown in a country. The parts of India which get the most rainfall are Assam, Burma, the lower Ganges Valley and the Western Coastal Plain. Rice is the principal crop of these regions. On the other hand, the rain-shadow portions of the Deccan and Rajputana get a much smaller amount of rainfall, and so millets (*jowar*, *bajra*, *marua*, *kodo*) are the chief crops. Wheat and cotton cannot be grown in an area of heavy rainfall like Bengal, but thrive in a dry area with the help of irrigation as in the Punjab and Sind.



SOILS MAP OF INDIA

Agriculture is the most important occupation of the people of India. Three-fourths of the inhabitants of the country are engaged in the cultivation of fields and the raising of crops. The Indian peasant works hard and patiently on his field, but his methods and tools are often much the same as those used by his forefathers in primitive times. He cultivates his field with a wooden plough. His ploughs are drawn by a pair of bullocks, his crops are harvested with a small iron scythe and threshed by the treading of bullocks.

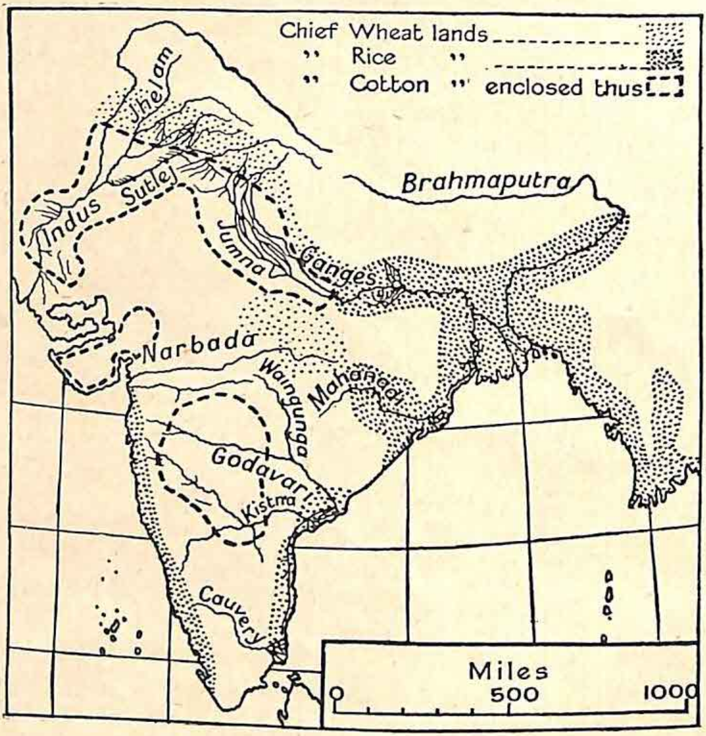


AREA GIVEN TO PRINCIPAL CROPS OF INDIA

Various grains and pulses occupy an area about equal to that showing cotton in the above diagram. The figures denote millions of acres.

The cultivated land is not as well manured as it ought to be for a large part of the cow dung from his cattle is burnt as fuel. In no other country of the world is so much valuable manure wasted as in India. In recent years, the use of improved agricultural implements is growing. Many lacs of iron ploughs are now in use and a number of tractors are employed in Bombay, the Punjab and the Central Provinces.

Chief Crops. The most important produce of India is **Rice.** It grows best in a hot moist climate. The rice field should be flooded during the growth of the plant. It is grown largely in the lower Ganges Valley (Bengal), Assam, Burma, the Western Coastal Plain, the Deltas of the Indus and the Deccan rivers. Excepting Burma, all the rice-growing areas are very thickly peopled and rice is sent out of the country only from Burma. In all the other



AREAS OF WHEAT, RICE AND COTTON IN INDIA
The marking of many waterways together, as indicated on the map, shows the districts where irrigation is especially important. Notice this is chiefly in the Indus and Ganges basins.

Provinces the rice grown is only just sufficient for the needs of the people. Next to rice, the largest area is given to the cultivation of **Millet.** This may be grown where the soil is poor and rainfall uncertain, and can thrive where there is not enough rainfall for rice, and where it is not cool enough in winter for wheat. Thus millet is grown in all those parts of the Deccan where rice cannot be grown. Parts of Bombay, Madras, the Central Provinces, Rajputana and Sind are given to the cultivation of millet. (Why is millet not much grown either in Bengal or in the Punjab ? Why is millet chiefly grown in Southern India, but not much in Northern India ? Why is millet grown to a much larger extent in Chota Nagpur than in Bihar ?) The chief varieties of millet grown in India are *jowar*, *bajra*, *marua*, and *kodo*. They are the cheapest of food crops.

Wheat requires a much smaller rainfall than rice, but only thrives where the winters are fairly cool. (Why is wheat not grown in Bengal ? Why is wheat chiefly a crop of north-western India and not of the Deccan ?) Wheat is grown largely in the Punjab and in the United Provinces. It is the most important crop of the Punjab. In the United Provinces, wheat is a more important crop than rice; in Bihar, wheat and rice are about equally important.

Pulses are plants which produce seeds inside a pod. They include all the *dals* eaten by us, viz. *arhar*, *masoor* (lentil), *moong*, *khesari*, *urid*, *matar* (pea) and *chana* (gram, chick peas). The various *seems* (beans) eaten by us as vegetables also belong to this class. Pulses have a high food value and are very useful to people who are vegetarians. They also enrich the soil in which they are grown. Most of them are cold season crops. They are grown all over the country.

Barley (*jao*) is not a very important crop of India. It can be grown in the same areas as are suitable for the cultivation of wheat. **Maize** (*bhutta*, Indian corn) was originally brought here by the Portuguese from America. It is also a minor crop.

Sugar-cane. The cultivation of sugar-cane has been largely extended during the last few years. It requires a damp, hot climate similar to that which favours the growth of rice. It is cultivated most extensively in the United Provinces and Bihar. Only a short time ago we imported huge quantities of cane sugar from Java, but now, with the increase of sugar-cane cultivation, we produce a large part of the sugar we need. Much of this is of course *gur*, and is prepared by the villagers for their own use.

Harvests. In Bihar and Orissa there are three harvests in the year: the *aghani*, *bhadoi* and *rabi*. The *aghani* harvest of winter rice takes place in November, the *bhadoi* in the rains, and the *rabi* harvest of cold season crops (wheat, barley, gram, pulses, oil-seeds) in the spring.

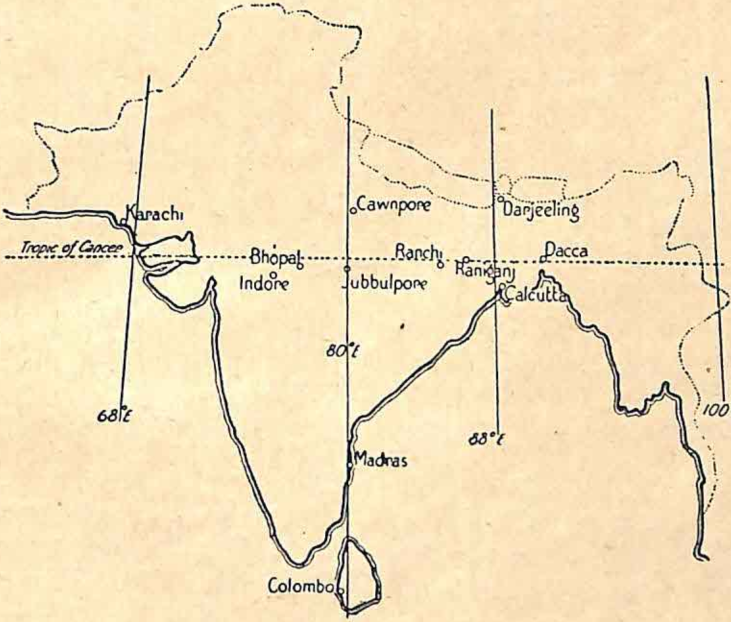
CHAPTER VIII

INDIA AND BURMA TREATED AS A WHOLE. THE GREAT REGIONAL DIVISIONS

INDIA is the central one of the three southern peninsulas of Asia. It has the vast land mass of Asia to the north, and the wide Indian Ocean to its south. Two of its sides are bounded by mountains and the other two by seas. The Tropic of Cancer divides India into two nearly equal parts. The southern part of India is a triangular peninsula. Note that India has a very convenient position for trade with countries round the Indian Ocean—East Africa, the East Indies, the Malay Peninsula and Australia.

Natural Regions. For convenience of study, geographers have divided the surface of the earth into Natural Regions. By natural region is meant a part of the earth's surface having the *same physical features* throughout. That is to say, a region may be composed entirely of mountains, another may be a plateau, or a third may be a river valley. A natural region is also composed of the *same kind of rocks*, i.e. it may contain only old hard crystalline rocks, or it may be entirely made up of fold mountains, or it may be wholly formed of river clay (alluvium). Thirdly, a natural region has the *same climate* throughout its whole area. As vegetation depends on soil and climate, it follows that the *same type of plants* will be found all over each natural region.

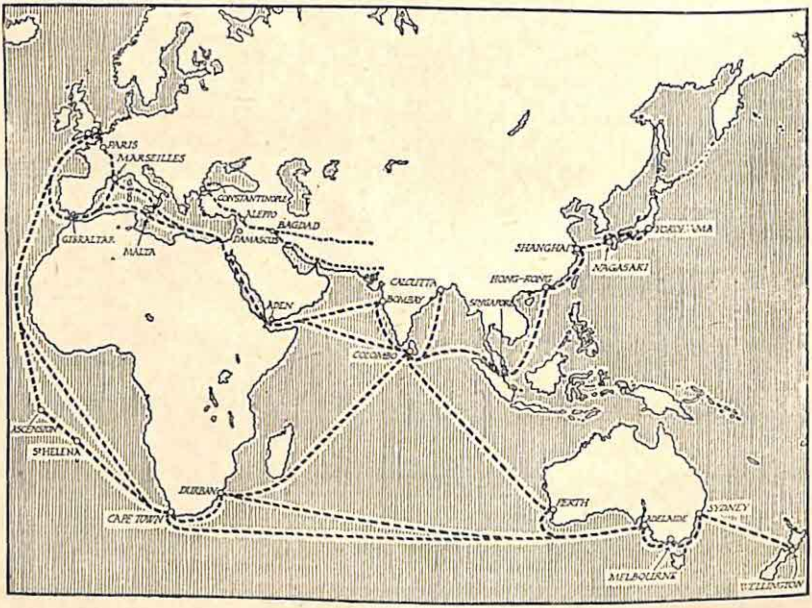
Regional Divisions of India and Burma. The four broad physical divisions of India are: (1) the **Himalayan Region,** (2) the **Indo-Gangetic Plain,** (3) the **Southern Tableland,** (4) the **Coastal Plains.** As the Indo-Gangetic Plain is a very important portion of India, we can sub-divide it still further into divisions which differ more or less from one another. We can divide the Indus Valley into two parts: (1) Lower Indus Valley or Sind, a desert area with a very small rainfall, about 5 in.; (2) Upper Indus Valley or the Punjab, where rainfall is 20 in., but still not sufficient for agriculture. The Ganges Valley is divided into (1) The Upper Ganges Valley which includes the greater part of the United Provinces. Rainfall is under 40 in.; more wheat is grown than rice; (2) The Middle Ganges Valley which includes part



THE POSITION OF INDIA

Notice the towns situated on or near the Tropic of Cancer. Notice also the towns which are just missed by the Meridians 68, 80, and 88.

of the United Provinces east of Allahabad, and Bihar. Rainfall here is under 50 in.; about equal quantities of wheat and rice are grown; (3) The Lower Ganges Valley or Bengal. Rainfall here is about 60 in., and only jute and rice are grown. If we remember that rainfall is very heavy in the Brahmaputra Valley, we will consider it as a natural division, corresponding roughly to Assam. Thus the Indo-Gangetic Plain may be divided into seven natural regions.

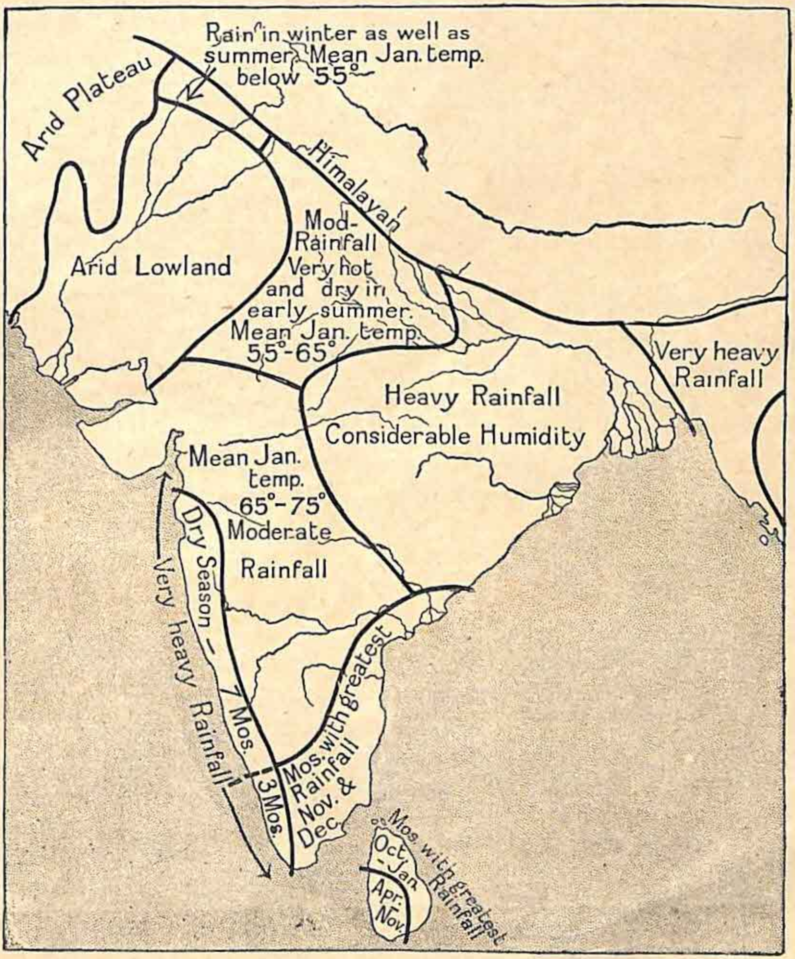


ROUTES TO INDIA AND THE EAST

Two important natural regions of the Southern Tableland may be noted: (1) Thar or the Great Indian Desert; (2) The Deccan Lavas region in the north-western part of the plateau having a fertile **Black Soil** which holds moisture for a long time and has been found to be very suitable for growing cotton.

The Western Coastal Plain forms one natural region. The Eastern Coastal Plain is divided into (1) the Carnatic Region, having winter rain, and (2) the Northern Circars where rain falls mainly in summer. Burma may be divided into five natural regions:

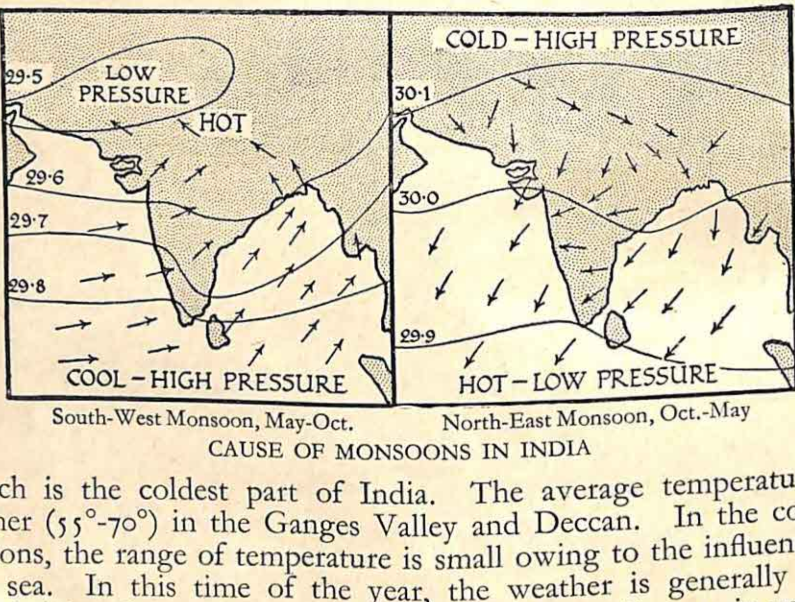
(1) the Coastal Strips with very heavy rainfall; (2) the River Deltas where rice is extensively cultivated; (3) the Shan Plateau, about 3,000 ft. high; (4) the Northern Hilly Region consisting of densely forested parallel chains of mountains; (5) the Dry Zone in the rain-shadow of the Arakan Yoma where rainfall is less than 40 in.



THE MAJOR CLIMATIC REGIONS OF INDIA

Comparative Study of Climatic Regions. The climate of India is governed largely by the **Monsoons.** These are seasonal winds that blow for half a year from sea to land and during the other half from land to sea. When the prevailing winds are from the sea in summer, we have a hot wet season, and in winter when the winds blow from land to sea, we have a cool dry season.

Winter. In December and January, the sun does not rise high in the sky. We get then only slanting rays of the sun which have not much heating power. The cool season prevails at this time, the average temperature being about 50° to 55° in the north-west, which is the coldest part of India. The average temperature is higher (55°-70°) in the Ganges Valley and Deccan. In the coastal regions, the range of temperature is small owing to the influence of the sea. In this time of the year, the weather is generally fine, the sky cloudless and we get plenty of sunshine. Some rain usually falls in the latter part of December or early in January. This is due to **Cyclones** coming from the Mediterranean Sea across the Plateau of Iran. This *Chota Bursat* is of great value to winter crops like wheat, peas, linseed, gram, mustard, etc.



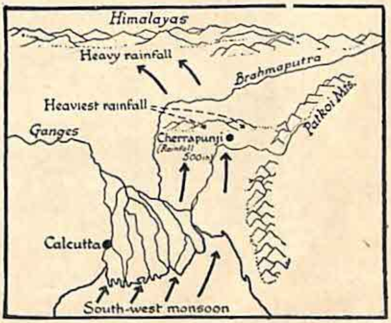
South-West Monsoon, May-Oct. North-East Monsoon, Oct.-May

CAUSE OF MONSOONS IN INDIA

Summer. As the sun gradually rises higher and higher in the sky during April and May, its rays become less and less slanting, and heat increases. The sky is cloudless, and May and June are very hot months. In the plains of Northern India, the average temperature is as high as 90°. Southern India, which is warmer than Northern India in winter, is now slightly cooler. This is due to the fact that Northern or Continental India is far removed from the influence of the sea and has a more extreme type of climate.

Rains. By the middle of June, the plains of Northern India become very hot and dry. This causes the atmospheric pressure to become low in this area. As air always moves from a region of high to low pressure, the wind blowing over the Indian Ocean, which has a comparatively higher pressure, now begins to make for the low pressure area. When they reach the shores of India, these winds are **South-West Winds.** As they have come over thousands of miles of sea, they are moist winds. Clouds form and rains accompanied by thunderstorms announce the beginning of the monsoon by the end of June. There is a welcome fall of temperature due to the heavy rains.

Rainfall is not uniform over the whole of India. The heaviest rain falls where high mountains stand in the way of the monsoon winds. Such regions are the Western Coastal Plain of Deccan, the coastal strips of Burma, Bengal and Assam. The heaviest rainfall in the world, 500 in., is at **Cherrapunji,** on the southern slopes of the Khasi Hills in Assam. The monsoon winds approach the Ganges Delta from the south, pass northwards over Bengal and are prevented from going north by the high Himalayas. The mountains turn the course of the monsoon so that it blows north-west up the Ganges Valley. Rainfall gradually diminishes as the rain-bearing winds pass over Bihar, United Provinces, and the Punjab. (See Chapter VI.)



RAINFALL AT CHERRAPUNJI

The driest part of India is that which lies to the west of the Aravalli Range. It includes Rajputana, Sind and Baluchistan. These are really deserts, but agriculture is carried on with the help of canal irrigation. The small amount of rainfall here is due to the following reasons: (1) it does not lie in the path of either the Arabian Sea or the Bay of Bengal branch of the monsoon; (2) there are no mountains to check the course of the moist winds blowing from the Arabian Sea up the Indus Valley; (3) the whole area becomes so hot and dry in summer that winds from the sea become dry in passing over the parched plains and no rain falls.

Retreating Monsoon. By the end of September the sun has moved to the south of the Equator and its rays become slanting again over India. The land gradually becomes cooler, the low pressure area over Northern India disappears and it becomes a high pressure area. The monsoon now blows from land to sea and brings very little rain to India (excepting the Carnatic Coast). The winter monsoon passing over the Bay of Bengal brings rain only to the Carnatic or Coromandel Coast. During the period of the retreating monsoons there are cyclones and storms in the Bay of Bengal. Bengal has often suffered from these violent storms at the end of the rainy season.

Our year is thus divided into four seasons:

(1) January and February—cool dry season.
(2) March to mid-June—dry hot season.
(3) Mid-June to mid-September—hot and damp season.
(4) Mid-September to December—season of retreating monsoon or decreasing rainfall.

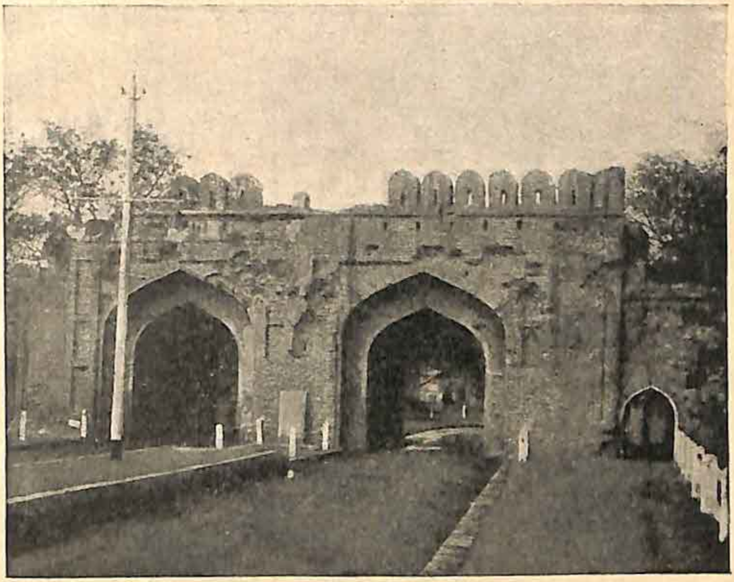
QUESTIONS

1. Explain why the South-West Monsoon is really a south-east wind in our part of the country.
2. North Bihar has a greater rainfall than South Bihar; Oudh has a greater rainfall than the Ganges-Jumna Doab; generally speaking the monsoon gives more rain to the northern side of the Indo-Gangetic plain than to the southern side. Why is this so?
3. What is meant by the statement 'one-sixth of the total rainfall of India is lost on the slopes of the Western Ghats'?
4. What is the direction of the retreating monsoon in the Indo-Gangetic Plain?
5. Name the part of India which is little affected by the monsoons.
6. What is the connexion between the monsoon and famines?
7. Explain: 'Man and two rivers have increased the agricultural lands of Northern India.'
8. Name the principal rivers of India that flow: (1) north-south, (2) east-west, (3) west-east. Why are there no rivers flowing south-north?

CHAPTER IX

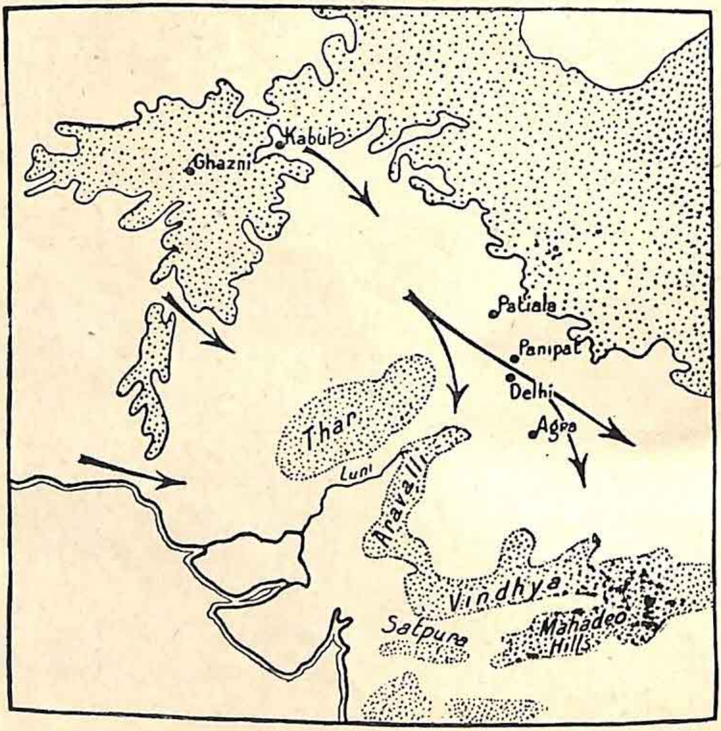
DELHI

DELHI, the capital of British India, is about equally distant from Calcutta (902 miles) and Bombay (865 miles). Delhi has been the capital of Hindustan (Northern India) from the very earliest times. It is supposed to be the site of Indraprastha, the capital of the Pandava kings of whom we read in the *Mahabharata*. Capitals of subsequent dynasties were established on this area, and their ruins today cover an area of almost 50 square miles. Modern Delhi dates from the building of the fort and Juma Masjid by Shah Jahan in 1668. It has been the capital of more empires than probably any other city in the world. You have read in your history book that Mohammad Ghori, Timur the Mughal, Nadir Shah the Persian, Ahmad Shah Durani the Afghan, Scindhia the Maratha, and the British have in



KASHMIR GATE, DELHI

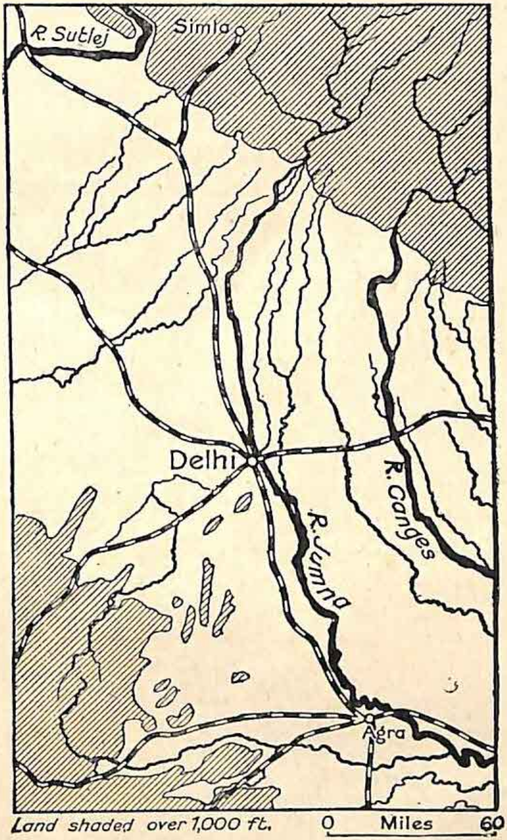
turn ruled over India from Delhi. New Delhi, named Raisina, is a fine modern town. It is served by the E.I., N.W., G.I.P., and the B.B. & C.I. Railways, which connect it with Calcutta, Lahore, Karachi and Bombay respectively. The Grand Trunk Road from Calcutta to Peshawar passes through Delhi.



DELHI GUARDS THE GATEWAY TO THE PLAINS

Reasons for its Selection as Capital. There is a wide natural roadway from the Punjab to the fertile well-watered plains of the Ganges. This is a level valley with the Himalayas on one side, the Aravalli Range and the Thar Desert on the other. The town of Delhi stands on a ridge, is safe from floods, has a natural drainage, and being situated in the middle of this highway, has a commanding position. Every successive invader of India from the north-west found it safe to have his capital there so as to be able to guard the gateway leading to the fertile regions beyond.

Famous Buildings. Among the most famous buildings of Delhi are the Juma Masjid, the Kutub Minar, the Purana Qila (old fort), the Residence of the Viceroy and the Imperial Secretariat. The Legislative Council (the Indian Parliament) is a round, pillared building half a mile in circumference. Nearly three lacs of men



DELHI RIDGE

were employed in building New Delhi, and the bricks used, if laid end to end, would go round the world four times.

THE VICEROY'S HOUSE, DELHI

THE WAR MEMORIAL ARCH, DELHI

THE COUNCIL HOUSE, DELHI

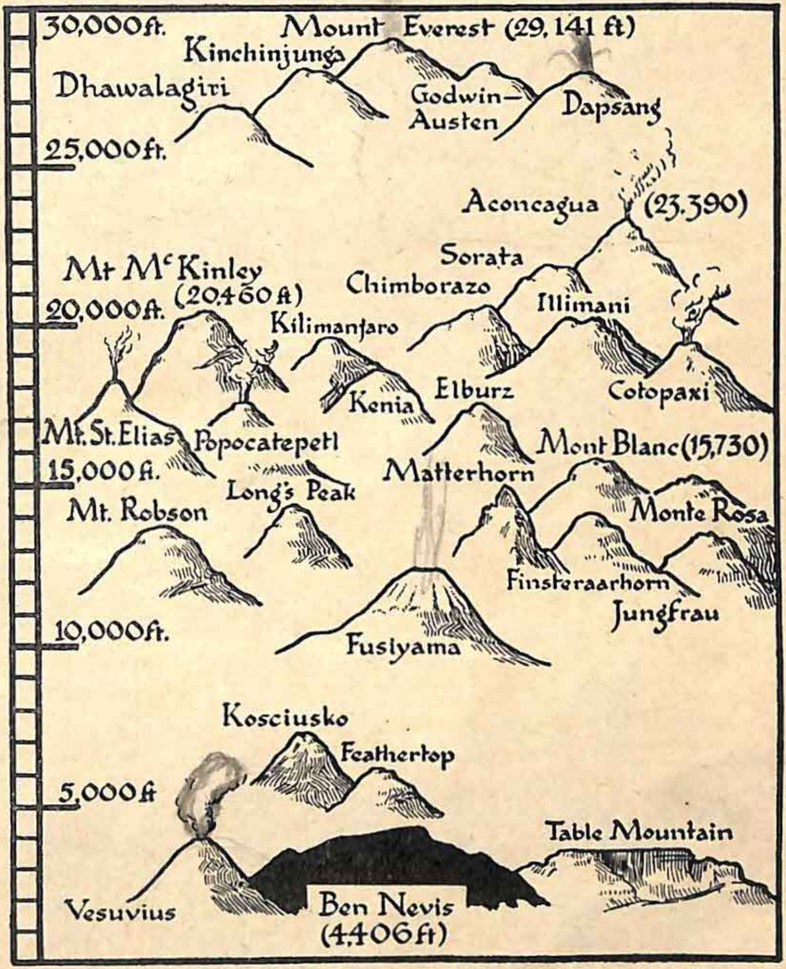
THE IMPERIAL SECRETARIAT, DELHI

Industries. Gold and silver filigree work, glazed pottery, wood carving, shawls and jewellery are the chief industries. There are also cotton mills, flour mills and sugar mills in Delhi.

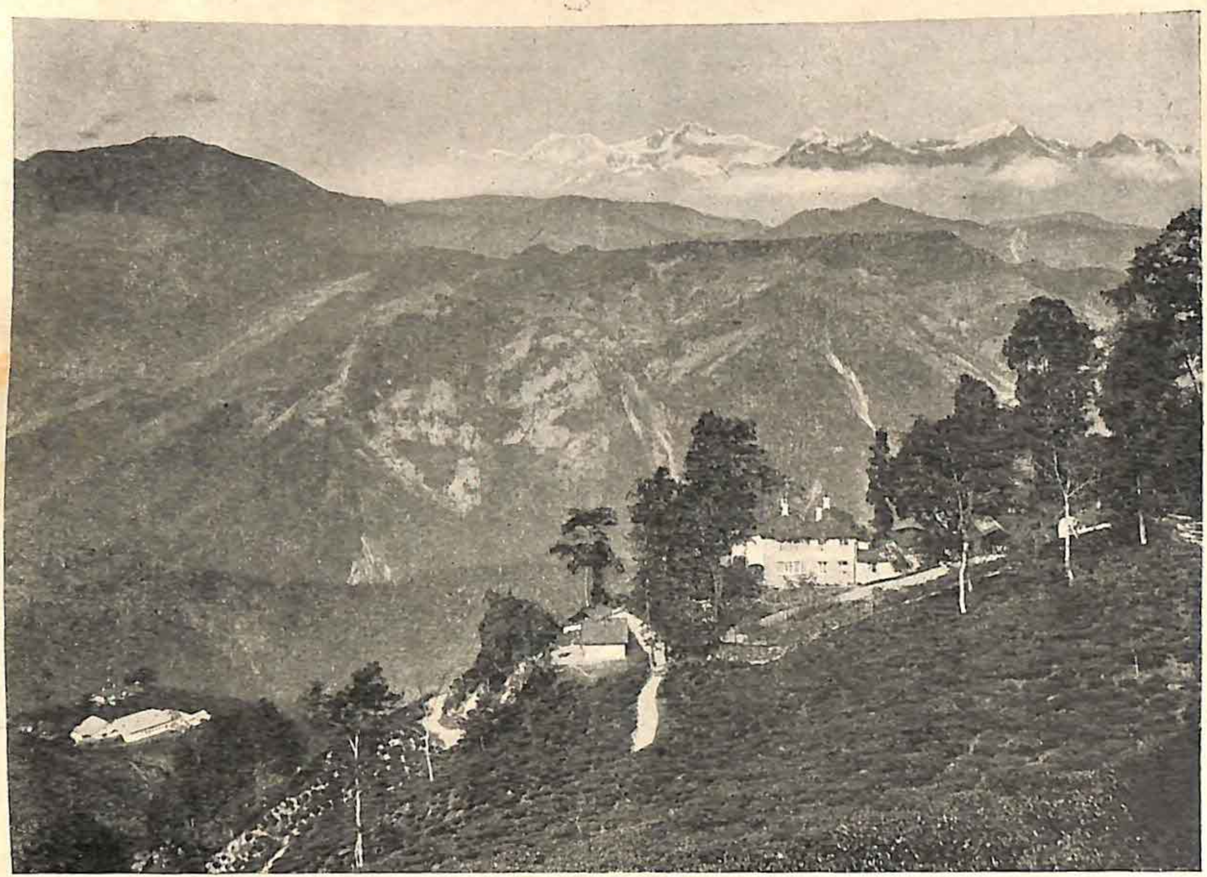
CHAPTER X

THE HIMALAYAS

THE **Himalayas** (Sanskrit, 'abode of snow') are the loftiest mountains in the world. This lofty snow-covered mountain system extends for more than 1,200 miles along the north of India. It consists of a number of chains, more or less parallel to one another, forming a mountainous belt 200 miles wide. Apart from Mount **Everest** (29,141 ft.) which is the highest peak in the world, there are no less than seventy-three peaks in the Himalayas which are between 23,000 and 29,000 ft. high. So that the first seventy-four peaks in the world are in the Himalayas, the seventy-fifth being Aconcagua in Chile. Among the famous Himalayan



HEIGHTS OF GREAT MOUNTAINS OF THE WORLD

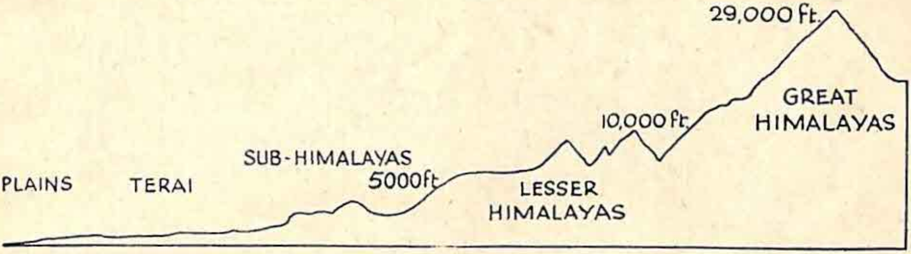


THE SNOWS, DARJEELING

At an altitude of 7,000 feet, Darjeeling is almost entirely surrounded by the snowy ranges of the Himalayas. Mount Everest (29,141 ft.) and Kinchinjunga (28,146 ft.) are visible from here.

peaks are Kinchinjunga (28,146 ft.), Dhawalagiri (26,795 ft.), Nanga Parbat (26,639 ft.), Nanda Debi (25,600 ft.).

The **Main Himalayan Chain**[1] consists of snow-covered peaks, many of which are over 20,000 ft. high. South of this, and parallel to it, are the **Lower Himalayas**[2], having peaks ranging between 6,000 and 12,000 ft. The Himalayan hill stations of Darjeeling, Naini Tal, Mussoorie and Simla are all situated in the lower parts of this ridge. Farther south, *in the western part*, is an elevated valley called the *duns* which has been built up of clay and rocks washed down from the higher ridges. This valley is about 2,000 ft. high, and is a well-watered region cut through by river courses. The town of Dehra Dun is situated in this valley. *In the eastern part*, south of Nepal, is a belt of marshy and grassy land, about 12 miles wide, crossed by many streams from the mountains, called the **Terai.** It is unhealthy and malarious and infested by tigers and elephants. Farther south is a line of **Foot Hills** called the **Sub-Himalayas** which are also roughly parallel to the main range.[3] North of the main Himalayan range there is a narrow valley separating the Himalayas from the Tibetan Plateau. The Indus and the Brahmaputra flow in opposite directions in this valley. To the north of the Upper Indus Valley is the Karakoram Range. **Mount Godwin Austen** (28,250 ft.), the second highest mountain in the world, is a peak of this range. **Mount Kailas** (22,028 ft.), which



NORTH-SOUTH SECTION OF THE HIMALAYAS

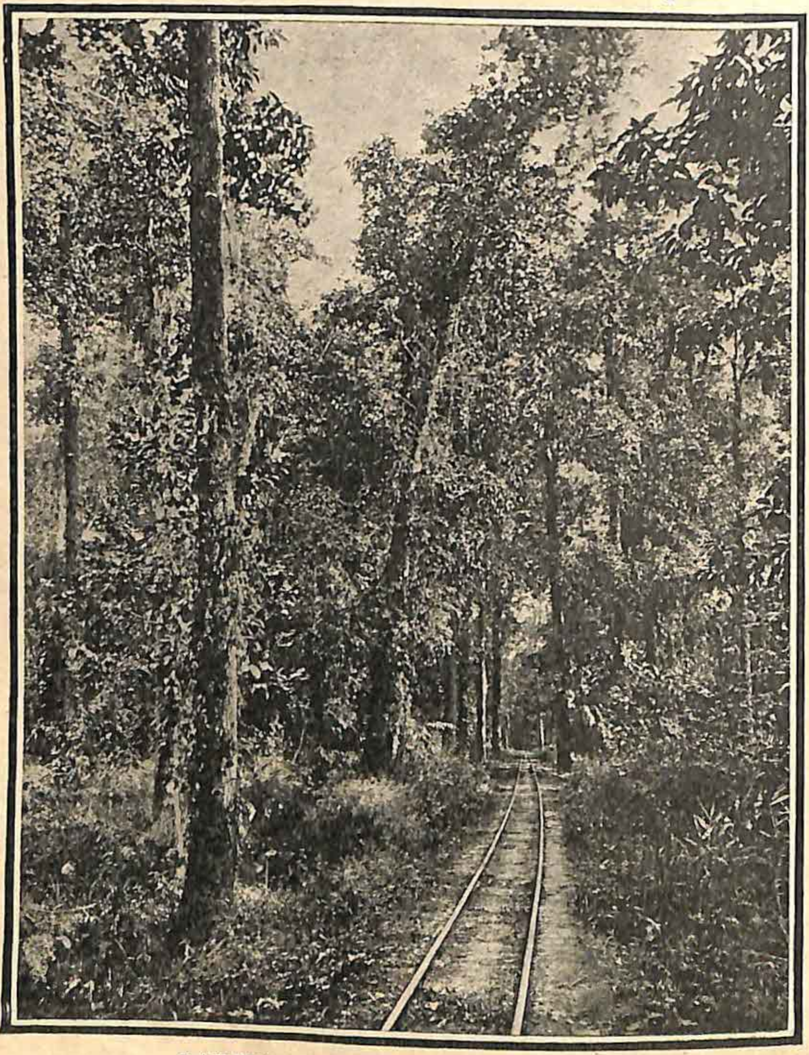
---

[1] Also called the **Great Himalayas** or **Inner Himalayas.**

[2] Also called the **Lesser** or **Outer Himalayas.**

[3] In the United Provinces these are known as the Siwaliks.

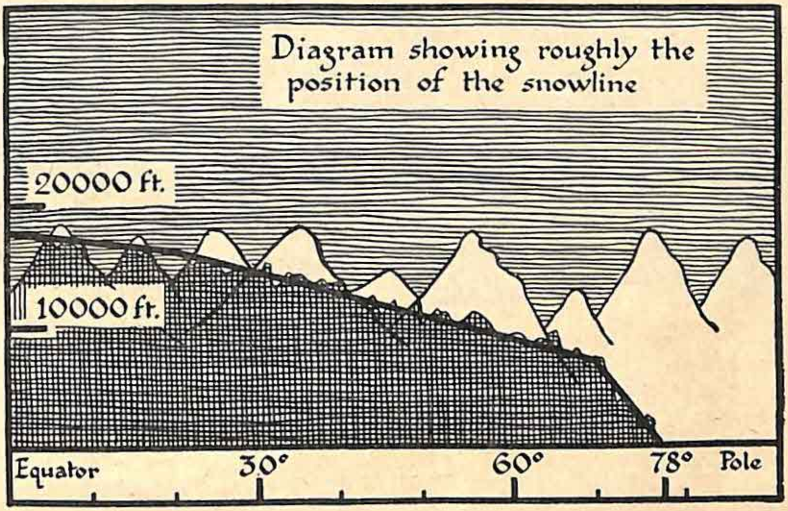
overlooks the Manasarowar Lakes, is in a spur of the Karakorams. The Indus, Sutlej and Brahmaputra (called Tsanpo here) have their sources near Mount Kailas. They have to break through the mountain ranges by deep gorges to reach the Indian plains. 'The



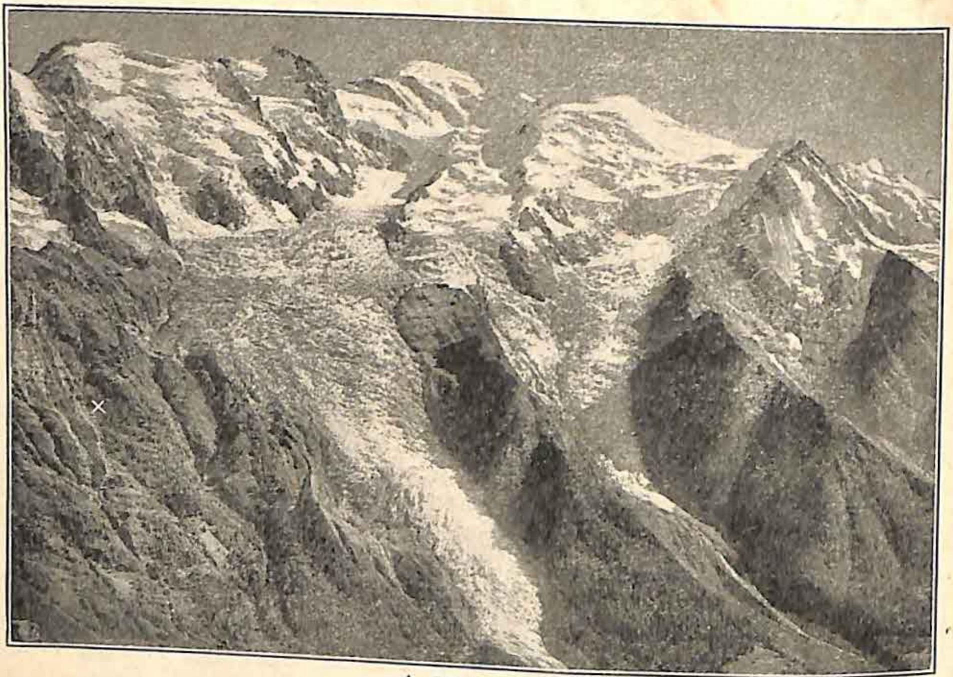
RAILWAY CUTTING THROUGH TERAI

Himalayas are an apparently endless succession of range after range, of ascent and descent, of valley and mountain-top, of river, torrent and brook, of precipitous rock and grassy slope, of forest and cultivated land, the like of which is not to be found in any other part of the globe.'

Snowline. We know that the higher we go up a mountain the colder it is. If we ascend to a height of about 17,000 ft. in the Himalayas, we will reach a place where the temperature is below the freezing point of water, and snow will not melt. Thus we can imagine a line at this height above sea-level, above which there is perpetual snow and ice. This imaginary line is called the **snowline.** The height of the snowline depends on the latitude of the place. The higher the latitude, the lower the snowline. In Switzerland, it is 9,000 ft. above sea-level; in the polar regions, it is at sea-level.



Glaciers. Masses of snow accumulate on tops of lofty mountains that rear their heads above the snowline. The lower layers of snow are pressed to ice by the weight of the upper layers. This mass of ice slowly slides down the mountain slopes, fills the valleys below, and continues its downward course as a slow-moving



A GLACIER

It can be seen from this photograph how glaciers can fill the upper valleys of very high mountains. Two main glaciers can be seen, separated by a ridge. The small cross on the left marks the course of a stream. Notice the steep narrow valley cut by the stream.

river of ice called a *glacier*. When it reaches the snowline, it melts and gives rise to a river. Many of the rivers of the world start their life as glaciers. The Ganges and the Jumna have their sources in the Gangotri and Jumnotri glaciers respectively. North of Almora is the Pindari glacier which gives rise to one of the feeders of the Ganges, the Pindar. Some of the largest glaciers in the world are to be found in the Karakorams.

Sources of Great Rivers. As many of the Himalayan peaks are above the snowline there are numerous glaciers coming down the slopes of these. There is also very heavy rainfall on the southern slopes of the Outer Himalayas. Thus many great rivers have their sources in the Himalayan Range. The Indus and its tributaries, the Jhelum, Chenab, Ravi, Beas and Sutlej; the Ganges and its tributaries, the Jumna, Gumti, Gogra, Gandak, Kosi; the

Brahmaputra and its tributary the Tista, all have their sources in the Himalayan glaciers, lakes or springs.

Lakes. There are several mountain lakes in the Himalayan region, all of which have very beautiful scenery. Among the well-known ones are (1) the **Wular** lake in Kashmir through which the Jhelum passes; (2) the lake (*tal*) round which the town of Naini Tal is situated; (3) the **Manasarowar** and **Rakas Tal** (Ravan Hrud) lakes in Tibet. These are at a height of 15,000 ft. above sea-level. The Sutlej, the Gogra, the Indus, and the Brahmaputra all have their sources in the neighbourhood of these sacred lakes. The Manasarowar lakes are places of pilgrimage for both Tartars and Hindus. Numerous ducks and other birds spend the summer in the neighbourhood of these lakes and come to India in the winter.

Health Resorts. In summer, the whole of the Indo-Gangetic Plain becomes very hot, and a maximum shade temperature of 115° is not unusual. Towns have been built on the slopes of the lower Himalayas to enable people to escape from the summer heat of the Indian plains. Some of these towns are used as summer capitals by the provincial governments. **Darjeeling** (7,000 ft.) is the summer residence of the Governor of Bengal. There is a fine view of Kinchinjunga to be obtained from here. **Naini Tal** (6,400 ft.) is the summer capital of the United Provinces. It is picturesquely situated on the shores of a beautiful lake, one mile long and 400 yards wide. **Simla** (7,100 ft.) is the summer residence of the Governor of the Punjab. It is also the summer capital of India. Look at the map and say why Bihar and Orissa has no hill station in the Himalayas. **Mussoorie** (7,200 ft.) is a popular hill station in the United Provinces. Almora (5,000 ft.), Dalhousie, Ranikhet and Lansdowne are smaller hill stations. These hill stations which are all situated at a height of over 5,000 ft. are much used as health resorts by convalescent people. There are tubercular sanitoria at Dharampur, near Simla, and Bhowali near Naini Tal. All the Himalayan hill stations have very beautiful scenery. Darjeeling and Simla are reached by mountain railways built at great cost, but all have motorable roads from the foot hills.

Himalayan Passes. The great height of the Himalayas naturally makes it very difficult to cross from India to Tibet. Still

ON THE DARJEELING HIMALAYAN RAILWAY

there are some difficult routes across the Himalayas by which a small amount of trade is carried on between the two countries. Some of the Himalayan passes are over 17,000 ft. above sea-level. There is a route which passes from Kalimpong, near Darjeeling, through the valley of the Chumbi river and the Jalepla Pass to the Tibetan town of Gyantse. Part of this route is followed by those who attempt to climb Mount Everest. The valley of the Kali (Sarda) river, which forms the boundary between western Nepal and British India leads to Garbyang. From there the road leads to Tibet by way of the Lipu Lekh Pass (17,000 ft. high). This route is used by pilgrims who visit the Manasarowar Lakes and Mount Kailas. Another route starts from Simla, follows the Sutlej Valley and leads to the Tibetan trading centre of Gartok by the Shipki Pass.

Places of Pilgrimage in the Himalayas. There are several important places of Hindu pilgrimage in the Himalayas. **Katmandu,** the Capital of Nepal, contains the Temple of Pashupatinath. Every summer thousands of pilgrims start from Hardwar and visit the shrines of **Kedarnath** and **Badrinath.**[1] The route is believed to be that which was followed by the Pandava brothers on their way to heaven. A few adventurous people visit **Gangotri,** the ice cave from which the Ganges starts its journey. All the above (excepting Katmandu) are in British territory, but a certain number of pilgrims also venture into Tibet to visit the sacred lake **Manasarowar** and go round **Mount Kailas.**

---

[1] An aeroplane service to Badrinath may be started in the near future.

Usefulness of the Himalayas. (1) Because of their great height, the Himalayas are difficult to cross. Hence India has no fear of being attacked by enemies from the north. We have not to keep armies to defend our Northern Frontier. (2) The Himalayas prevent the moisture-bearing winds from the Indian Ocean passing to Tibet. Heavy rain falls on the southern slopes of the Himalayas and the great rivers of Northern India are supplied abundantly with water. The fertility of the Indo-Gangetic Plain is entirely due to the silt brought by these rivers. In fact, as we shall read in the next chapter, the Himalayas have given rise to the Indo-Gangetic Plain. (3) The Himalayas also protect our country from the cold winds of Central Asia. (4) Valuable timber, medicinal herbs, tea and cinchona are obtained from the Himalayan slopes. (5) Many hill stations in the Himalayas enable the people of the Indian plains to escape from the summer heat and recoup their health.

QUESTIONS

1. Can we call a glacier a frozen river? If not, why not?
2. Why are mountains wetter than plains?
3. Show from the map that the Indo-Gangetic Plain gets all the water that falls (as rain or snow) on both the southern and northern slopes of the Himalayas.
4. Why are there no railways over the Himalayas?
5. How do the Himalayan glaciers benefit the people living in the Indo-Gangetic Plain?
6. Why are there no glaciers to be found in the Deccan?

CHAPTER XI

THE INDO-GANGETIC PLAIN

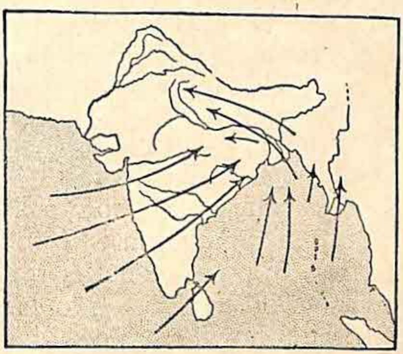
Extent. South of the mountain belt of the Himalayas lies the plain through which the Indus, the Ganges and their tributaries flow. This plain stretches across the whole of Northern India for a distance of nearly 1,500 miles. The plain of the Indus is separated from the plain of the Ganges by a wide highland which extends from the Aravalli Hills to the Himalayas. This belt is about 800 ft. high and acts as a water-parting between the Jumna and the Sutlej. The Indo-Gangetic Plain extends from the Iran Plateau (Afghanistan and Baluchistan) on the west to the hills of Assam on the east. It has the Deccan Plateau to its south.

Origin. Geologists tell us that the whole area of this plain was a sea in former times. The plain has been formed by the silt (sand and clay) brought by the Indus and the Ganges from the Himalayas. The sand and clay brought by these rivers were deposited layer after layer on the bed of the sea till it was raised to water level. Movements of the earth's crust have finally raised the deposited sediment to a height above sea-level. The rivers still continue to flow through the newly-made land and have changed their courses many times, spreading silt over a wide area.

Nature of Soil. The Indo-Gangetic Plain consists of sand, clay and mud brought by rivers from the Himalayas. Such material brought down by rivers and spread out over plains is called **Alluvium.** These alluvial deposits of the Indo-Gangetic Plain are of very great depth, in fact, nobody knows how deep they are. A boring at Calcutta went down 481 ft. without touching any rock. A boring was made at Lucknow to a depth of 1,000 ft., but still there was nothing but alluvial clay at the bottom of the hole.

The river plain of Northern India is one of the largest of the alluvial plains of the world. Such river-made plains are always very fertile, as they are composed of broken materials from many different kinds of rocks over which the river has flowed in its course. Such alluvial plains are sure to contain all the materials that are needed by plants for their food. So it happens that in all parts of the world, the alluvial plains are the most fertile areas, and because of the large amount of crops that can be grown, are also very densely peopled.

Relation of Fertility to Rainfall. For agriculture, good soil and sufficient rainfall are essential. Although the soil of the whole of the Northern Indian Plain is more or less of the same nature, i.e. alluvium, rainfall is not the same in all parts of the plain. It gets most of its rain during the latter part of summer. May and the first half of June are very hot and dry. In the latter half of June winds start blowing from the Arabian Sea and the Bay of Bengal in a north-easterly direction. As winds are named after the direction from which they blow, these winds from the sea are south-west winds. They are very moist as they have come thousands of miles over the sea. When they come to India, clouds appear, thunderstorms occur, and heavy rain falls. This is called **Monsoon Rain.** This rainfall is not equally distributed over the country. In the Indo-Gangetic Plain, the monsoon winds enter from the Bay of Bengal across the Ganges Delta, pass northwards, and are then turned in a north-westerly direction by the Himalayas and thus blow over the whole of this plain. Proceeding inland, they continue to drop moisture as rain and become drier and drier. Thus the Lower Ganges Valley or Bengal gets more rain than the Middle Ganges Valley (Bihar). The Upper Ganges Valley (United Provinces) gets more rain than Bihar, and the Upper Indus Valley (the Punjab) gets the least rain of all. This will be more clearly seen from the following figures for the rainfall of different places in the Indo-Gangetic Plain :—



THE MAIN CURRENTS OF THE S.-W. MONSOON

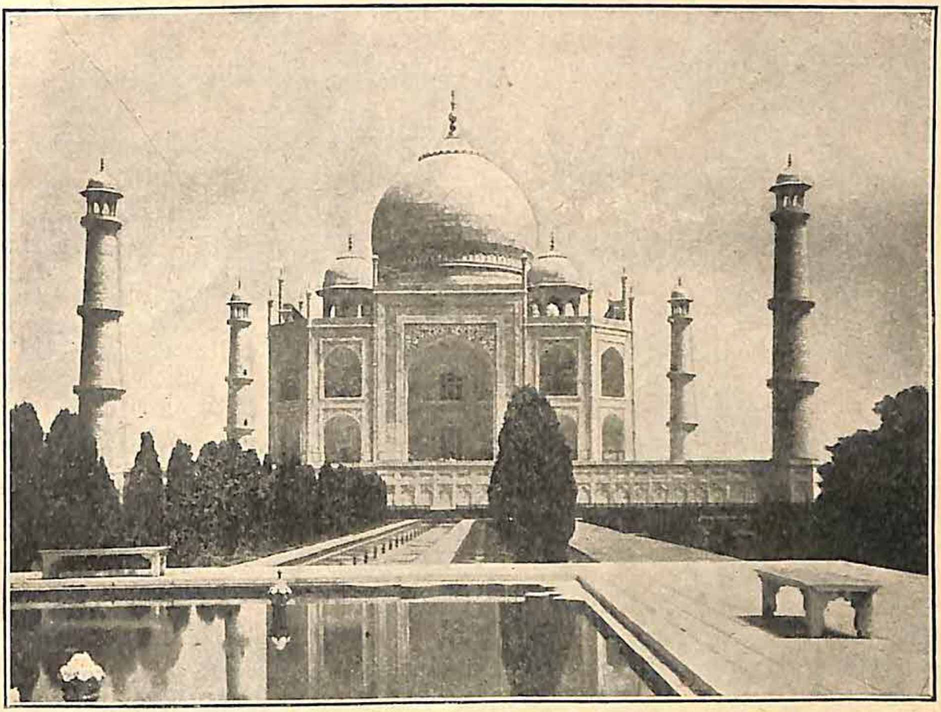
Place	Rainfall
	inches
Saugar Island (Ganges Delta)	69
Calcutta	63
Burdwan	59
Patna	49
Benares	41
Allahabad	39
Cawnpore	36
Meerut	32
Delhi	27
Lahore	20
Peshawar	13

Bengal, which has the highest amount of rainfall, is naturally the most fertile part of the Indo-Gangetic Plain. Fertility as measured by the production of crops gradually decreases as we proceed from the eastern to the western part of this plain. No artificial watering (irrigation) of the fields is necessary in Bengal, but in the Punjab no agriculture is possible without irrigation.

Density of Population. India is an agricultural country, and so the largest number of people live in those areas where crops can be most easily grown. The most thickly populated areas are those which have good soil and a sufficient supply of water. Density of population is indicated by the number of people living in a square mile. The relation between density of population and rainfall in the various parts of the Indo-Gangetic Plain will be seen from the following table :—

	Rain	Density of Population
	inches	
Bengal	75	646
Bihar	52	600
United Provinces	38	455
Punjab	20	237

The density of population in the Punjab is much greater than it would have been if the people depended only on rainfall



THE TAJ MAHAL, AGRA

for agriculture. We shall see later how the Punjab cultivator gets his water from canals. Before the canals were made nothing could be grown in a large area of the Punjab.

Work of Rivers. The rivers that flow through the Indo-Gangetic Plain have levelled the land by their floods, and so they flow slowly through the plain. Floods still occur in the lower courses of the Indus and the Ganges, and fertilize the land with fresh deposits of silt. (Why are there no towns on the Ganges between Bhagalpur and the sea? Except Hyderabad (which stands on a hill) none of the important towns of Sind and the Punjab are on the Indus; can you say why?) An idea of the amount of solid matter carried by these rivers when in flood will be obtained from the fact that 20 maunds of Ganges water contain one seer of earthy matter. The deltas of the Ganges and Indus are extending seawards by the deposition of this huge amount of mud brought by the rivers.

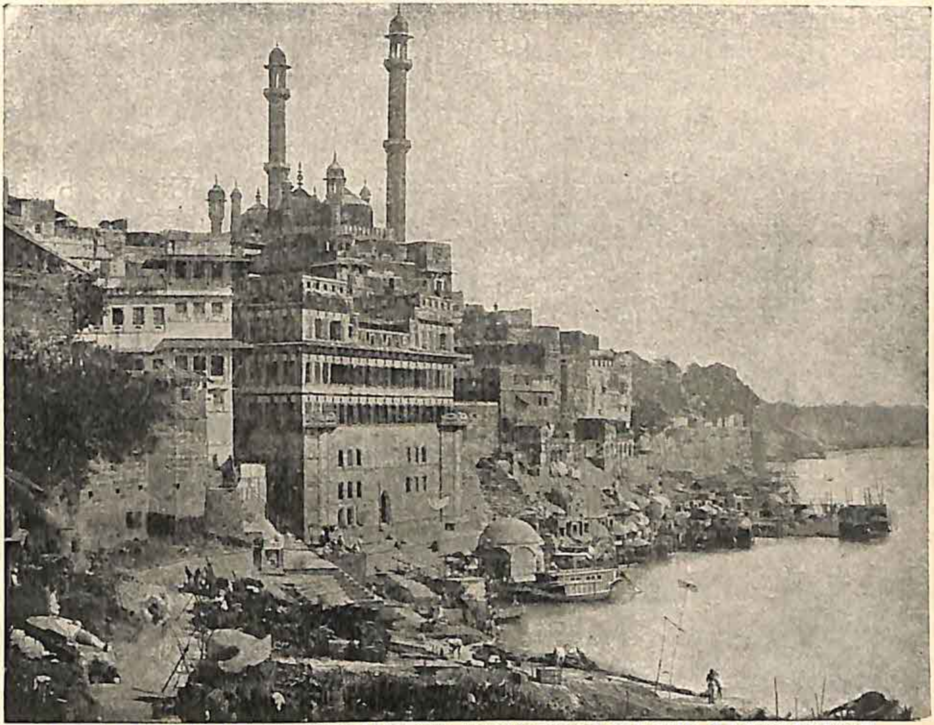
The gentle slope of the Indo-Gangetic Plain will be evident from the following table:—

Place	Height above Sea feet
Calcutta	21
Burdwan	99
Patna	183
Benares	267
Allahabad	309
Lucknow	368
Agra	555
Delhi	718
Lahore	702

The rise from the shores of the Bay of Bengal to the Punjab is about one foot in two miles.

This gentle slope of the plain is evident to us when we go on a railway journey. The monotonous character of the Indian landscape, as seen through a railway carriage window, is due to the level nature of the plain. The railway engineer has taken full advantage of the very gentle slope of the plain, and no other part of the country is so well supplied with a network of railways.

Important Towns. We have seen before that the Indo-Gangetic Plain is very fertile and productive and, as a consequence of this, it is also very densely peopled. The level nature of the plain makes transport easy by land or by the rivers. Under these circumstances, we should expect a large number of important towns in this area. Excluding Burma, there are thirty-six cities in India having a population of over one lac. Seventeen, or nearly half of these, are in the Indo-Gangetic Plain. You will be able to name many of them easily: Dacca, Calcutta, Patna, Benares, Allahabad, Lucknow, Cawnpore, Agra, Delhi, Lahore. The presence of so many large cities in this plain is also one of the reasons why it is so well provided with railways.



BENARES, WITH THE MOSQUE OF AURUNGZEB IN THE BACKGROUND

QUESTIONS

1. Why are metalled roads costly to build in many parts of the Indo-Gangetic Plain ?
2. Explain why the Indo-Gangetic Plain, having one-third the area of India, contains two-thirds of its population.
3. Why have so many of the Indian rivers been regarded as sacred ?
4. Why does the Ganges begin to rise even before the rains have started ?
5. Tennyson wrote of a river in a plain as 'the brimming river'. Explain what he meant.

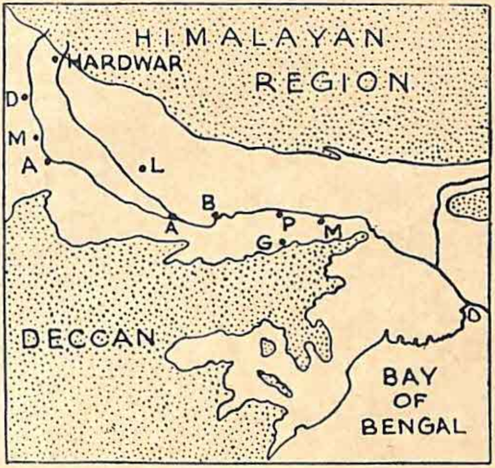
CHAPTER XII

THE RIVER GANGES

THE **Ganges,** the sacred river (*Gunga mai*) of the Hindus, begins its course from the melting ice of the Gangotri Glacier in the Himalayas. In the mountain stage of its course, it descends rapidly through rocky gorges till it comes to the plains at Hardwar. From here to Lower Bengal it has its plain stage, and finally it reaches the sea through a number of mouths, forming the largest delta in the world. The southern part of this delta is an unhealthy region of swamps and jungles and is called the *Sundarbans* from the large number of *Sundri* trees growing there.

Throughout its course, the Ganges receives a large number of tributaries which serve to swell its volume very largely. Thus, at Hardwar one can easily walk across the river in a few minutes without even wetting one's clothes, but near its mouth one can hardly see the opposite bank. In the mountain part of its course, where it is known as the Bhagirathi, it receives several small tributaries: the Alakananda, Jahnavi, Mandakini, Pindar and Dhauli. All these are small rivers, but their names are familiar to readers of Hindu scriptures. The valley of the Ganges lies between the Himalayas and the Deccan Plateau. The Ganges receives tributaries from both these highland regions, but as there is heavy rainfall on the Himalayan slopes, the streams that come from Nepal are larger and swifter than those coming from the south. The force of the rushing tributaries from the north has pushed the Ganges southwards so that it is nearer to the edge of the plateau than to the Himalayas. These tributaries are: (1) the **Gumti** which joins the Ganges east of Benares; (2) the **Gogra** (with its tributaries, the Sarda (Kali Nadi) and the Rapti) which joins the Ganges near Chapra; (3) the **Gandak,** joining the Ganges opposite Patna; (4) the **Kosi.** The most important tributary of the Ganges is the **Jumna** which has its source at the Jumnotri Glacier, not far from the source of the Ganges. The Mussoorie Hills form the water-parting between the Ganges and the Jumna at the mountain stage of their course. The Jumna flows past the important cities of Delhi and Agra, receives the waters of the Chambal and the Betwa from the Vindhyas, and joins the Ganges at Allahabad.

The confluence (*sangam*) of the two rivers, the Ganges and the Jumna, is regarded as a holy place by the Hindus.[1] The only other important tributary of the Ganges on the south bank is the Sone. After leaving Hardwar and reaching the plain stage of its course, the Ganges flows past Cawnpore, Allahabad, Mirzapur, Benares, Ghazipur, Buxar, Patna, Monghyr and Bhagalpur. Beyond Bhagalpur, it has to round the Rajmahal Hills, which form the north-eastern corner of the Deccan Plateau. About 220 miles from the sea the river begins to spread out and form a delta. The main channel, the **Padma,** flows in a south-eastern direction, and is met at Goalundo by the main stream of the Brahmaputra, and these two streams form a great estuary known as the **Meghna.** This great channel is the most easterly of all the channels of the delta. On the other side is the **Hooghly,** the most westerly of all the channels. On it stands the city of Calcutta. The total length of the Ganges is nearly 1,700 miles.



THE VALLEY OF THE GANGES
Name the towns.

Navigation. Ocean-going steamers come up to Calcutta which is 80 miles from the sea. Smaller river steamers ply on the river up to Buxar, and a very large quantity of goods is carried up and down the river by country boats. Water transport is slower but cheaper than land transport, and is preferred for all cheap but heavy articles.

---

[1] It is here that the *Kumbh* and *Magh Melas* are held. The former takes place every twelfth year when millions of pilgrims from all parts of India assemble for bathing and performing religious rites. It is the largest religious fair of its kind in the world. The *Magh Mela* is held annually during January and February.

Canals. The following important canal systems are associated with the Ganges and its tributaries: The **Sarda Canals** supply water to a large area in Oudh. The river Sarda (Kali Nadi) forms the boundary between western Nepal and British Kumaon. The **Upper Ganges Canal,** the **Lower Ganges Canal,** and the **Eastern Jumna Canal** irrigate the United Provinces doab. The **Western Jumna Canal** irrigates the eastern border of the Punjab. The **Sone Canals** irrigate South Bihar. The **Tribeni Canal** from the Gandak irrigates Champaran district.

Floods. In the past ages, the Ganges must have flooded large parts of the country through which it flows. But now, by gradual laying down of silt, it has raised its banks in the upper and middle parts of its course, so that it is not usual for the river to overflow in the United Provinces or Bihar. But floods still occur in the lower deltaic part of its course, and the great fertility of Eastern Bengal is largely due to the fresh soil laid down by the river every year. If you look at the map, you will see that except Calcutta, there are no towns on the banks of the Ganges between Bhagalpur and the sea. This shows that the whole of Lower Bengal was subject to floods of the Ganges until recent times.

QUESTIONS

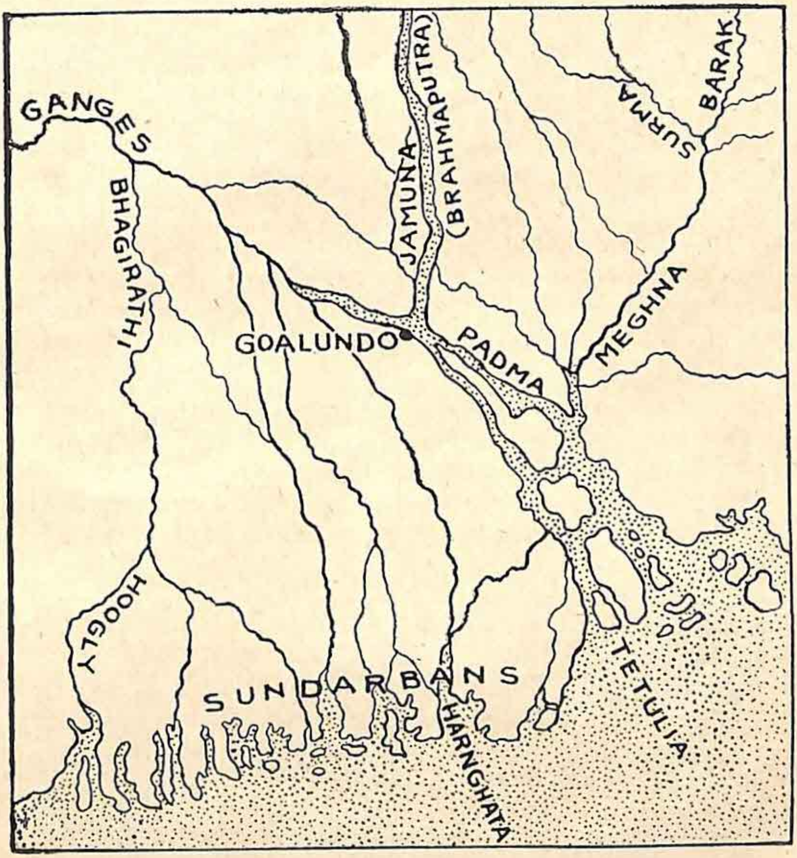
1. Make a list of the uses of rivers.
2. How far are floods harmful, and how far are they useful to man?
3. Which is more likely to have a good port, a delta or an estuary? Why?

CHAPTER XIII

THE GANGES DELTA

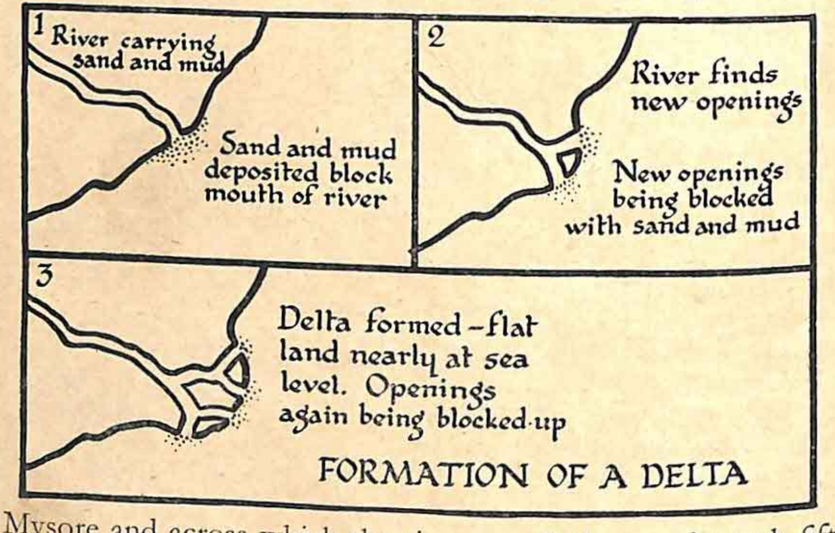
SOON after the Ganges has turned round the Rajmahal Hills, it begins to bend to the south-east. The Ganges Delta may be taken to begin where the Bhagirathi, whose lower course is known as the Hooghly, branches off from the main river. This point is about

300 miles from the Bay of Bengal. The main stream continues its south-eastern direction and is known as the **Padma.** Near Goalundo, it is joined by the **Jamuna,** the main stream of the Brahmaputra, and the united stream forms the **Meghna** estuary. It is curious that the people of Bengal consider the branch **Bhagirathi** to be the main stream of the Ganges and do not regard the Padma as an important or a holy river.



THE GANGES-BRAHMAPUTRA DELTA

Origin and Formation. The Ganges is constantly bringing down a heavy load of mud and sand from the upper part of its course. When such a river reaches the sea, its current is checked, and the silt carried by the river is deposited at its mouth. The river is thus forced to make its way to sea by branches which pass on either side of the deposit. The triangular plot of land formed in this way at the mouth of a river is called a **Delta** because it resembles the Greek letter Δ. The largest delta in the world is that of the Ganges and the Brahmaputra which encloses a region as large as the state of Mysore and across which the rivers reach the sea through fifteen mouths.[1] The Lower Ganges Valley, which is the greater part of Bengal, is really the delta of the Ganges. The whole of this region is a low-lying fertile, alluvial plain. In course of time, the delta of the Ganges has gradually moved from west to east. The **Old Delta** included central and western Bengal. These are now areas of 'dead and dying rivers'. Formerly, the branches of the Ganges, passing through these areas, carried a large volume of water to the sea, but now very little water passes through them, and swamps have been left in what were formerly water-courses. The diminution


1
River carrying sand and mud
Sand and mud deposited block mouth of river
2
River finds new openings
New openings being blocked with sand and mud
3
Delta formed – flat land nearly at sea level. Openings again being blocked up

FORMATION OF A DELTA

---

[1] The Hooghly, Satharmukhi, Jamira, Matla, Guasuba, Raymangal, Malancha, Marjata, Bangara, Haringhata, Kabodak, Biskhali, Titulia, Mathabhanga, and Bhairab.

THE SUNDARBANS

of water flowing through the river channels has made the country malarious and many prosperous river ports in these areas have been deserted during the last 150 years. In many places, the old river beds have been converted into rice fields. Eastern Bengal is the **New Delta** of the Ganges. Here, new land is being formed every year with the mud brought by the branches of the Ganges and the Brahmaputra. During the rains, a large area of the country is flooded and silt spread over the land, making it highly fertile for the production of jute and rice. There are few towns and hardly any roads or railways in this area, all transport and communication being done by boats.

Vegetation. Near the sea are the **Sundarbans,** an extensive swampy forest which supplies timber, fuel and thatching materials (bamboo, grass) to the towns and villages of Lower Bengal. Owing to increase of population in Bengal, the forests in the northern part of the Sundarbans have been largely cut down and the land used for growing rice.

The Sundarbans have been named after the *Sundri* tree, the wood of which is largely used in making country boats. Near the sea front, the forest is almost entirely composed of mangrove trees which can live in salt water. The **Mangrove** is a peculiar tree which grows along the muddy shores of all tropical countries. The seeds germinate while the fruit is still on the tree, long roots come out, and finally the fruit drops down, and the young plant takes root in the mud soaked with sea water. The roots form a great network and are constantly washed by the sea water.

The Sundarbans forests are infested with snakes, crocodiles and tigers.

Comparison with other Great Deltas. The only other rivers which have large deltas comparable in size with that of the Ganges, are the Mississippi in America and the Nile in Africa. The deltas of these rivers are much smaller in area than that of the Ganges, and there are no dense forests there.

QUESTIONS

1. Explain: (*a*) The Ganges delta is formed of the debris of the crumbling Himalayas. (*b*) The Himalayas hamper navigation at the mouth of the Ganges.

Bom

one more

CHAPTER XIV

CALCUTTA

Calcutta, the former capital of India, was founded by the English merchant, Job Charnock, in 1686. It is situated on the left bank of the Hooghly river, a branch of the Ganges, and next to London is the largest city in the British Empire. Although situated 80 miles from the sea, it is the most important port of India and is the centre of the jute, tea and coal trades. The port extends for 10 miles along the river and is the inlet and outlet of the eastern half of the Indo-Gangetic Plain, as well as of the Brahmaputra Valley, and is one of the most fertile and densely populated areas of the world. All the manufactured articles, machinery, metals, and luxury goods required by the millions of inhabitants of this part of the country are imported through the port of Calcutta. All the raw materials exported from this large area—tea from Darjeeling and Assam, jute from Bengal, coal from the Jheria-Ranigunj Coalfields, iron from Jamshedpur, oil-seeds and hides from the United Provinces, and mica and lac from Chota Nagpur—are exported to many parts of the world from the port of Calcutta, which deals with a third of the total trade of India. On the opposite bank of the Hooghly and connected with Calcutta by a floating bridge, 1,528 ft. long, is **Howrah,** the industrial suburb of Calcutta. There are many jute mills and engineering works in Howrah.

Communication with Places Inland. Calcutta is connected with the neighbouring parts of India by trunk lines. The E.I.R., starting from Howrah, passes through the coal districts and the most important towns of the Ganges Valley, viz. Patna, Benares, Allahabad, Lucknow, Cawnpore and Delhi. The B.N.R. and G.I.P. lines, running across the peninsula, connect Calcutta and Bombay. The B.N. and M.S.M. Railways join Calcutta with towns on the Eastern Coastal Plain—Cuttack, Puri, Vizagapatam, Madras. The E.B.R. connects Calcutta with North Bengal and Darjeeling. Jointly with the A.B.R. it makes communication possible between Calcutta and the Brahmaputra Valley (Assam).

Manufactures. In spite of the fact that neither raw materials nor coal is available near by, Calcutta is an important industrial city. This is due to the fact that there are excellent means of communication for bringing together here both raw materials and coal from up-country. Machinery can be imported by the sea route; there is a huge population to supply labour and a great local demand for the manufactured articles. The manufacture of jute into gunny bags and hessians (gunny cloth) is the most important industry, but there are paper mills, flour mills, engineering works, dockyards, oil mills, cloth mills, tanneries, biscuit and soap factories in and about the town of Calcutta.

OLD COURT HOUSE STREET, CALCUTTA

University and Schools. The University of Calcutta was founded in 1857, the year of the Sepoy Mutiny. There are 17,000 students in Calcutta, studying in the various colleges. Next to Paris, Calcutta has the largest University in the World. The Government maintains four Arts Colleges, one Training College, one Engineering College, two Medical Colleges, a Veterinary College, a School of Art and a Commercial School. Besides these, there are five Government High Schools. The Calcutta University maintains a Law College.

Public Buildings. The important buildings of Calcutta are Government House, the High Court, Writers' Buildings (the Bengal Secretariat), the General Post Office, the Museum, the Town Hall, and the Imperial Library. Calcutta has been called 'the City of Palaces' owing to the large number of fine buildings in the City.

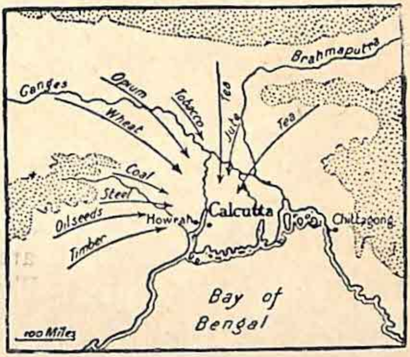
Parks. The largest space in Calcutta is called the **Maidan.** Two miles long and one mile broad, it faces Chowringhee, a fine road with splendid mansions and shops, and has Fort William and the river to the west. The beautiful Victoria Memorial is at its southern end. Adjoining the Maidan is a beautiful park—the **Eden Gardens.** On the other side of the river, at Shibpur, are the Royal Botanical Gardens. The **Zoological Gardens** are to the south of Calcutta at Alipur.

Calcutta Time. Calcutta is the only large city in the world which does not keep Standard Time. The local time of Calcutta is twenty-four minutes in advance of Indian Standard Time which is the time observed by the whole of the rest of India.

Exports. The principal exports of Calcutta are food grains (rice, wheat flour), tea, jute, coal, hides and skins, iron and steel, mica, jute, oil-seeds and lac. You ought to be able to say where each comes from.

Imports. Wines (Europe), sugar (Java), tobacco (England, U.S.A.), salt, kerosene oil (Burma, U.S.A.), motor-cars (U.K., U.S.A), drugs and medicines, machinery, iron and steel goods, paper, cotton goods, silk, woollen goods.

Population. Including Howrah, Calcutta has now a population of 15 lacs. This means that Calcutta-Howrah has ten times the population of Patna. Even excluding Howrah, Calcutta has a population greater than that of



SKETCH MAP SHOWING THE POSITION OF CALCUTTA
and commodities sent to this port from the surrounding region.
(Dotted areas represent high land.)

Bombay. People from almost every part of the world are to be found in Calcutta. Most of these foreigners are associated with the trade and commerce of this great port.

CHAPTER XV

THE DECCAN

Position. South of the Indo-Gangetic Plain lies a plateau which is largely made up of very ancient crystalline rocks.[1]

Origin. Before the formation of the Indo-Gangetic Plain, this plateau was an island. When the crumpling movement of the earth's crust produced the great fold mountains of the Himalayan chain, there also appeared huge cracks on the north-western part of the surface of the plateau. From these cracks huge quantities of molten lava came out and solidified in thick beds. Thus we have the region of the **Deccan Lavas** extending over the north-western part of the plateau. Lines joining Baroda, Jubbulpore and Goa will roughly show this area of solidified lava sheets. The river Narbada divides the plateau of South India into two parts. The northern part is called the **Malwa Plateau** or the plateau of Central India. East of the Narbada Valley it is joined to the southern **Deccan Plateau** (Sanskrit *dakshin*, south).

The plateaux of India are much older than the Himalayas.

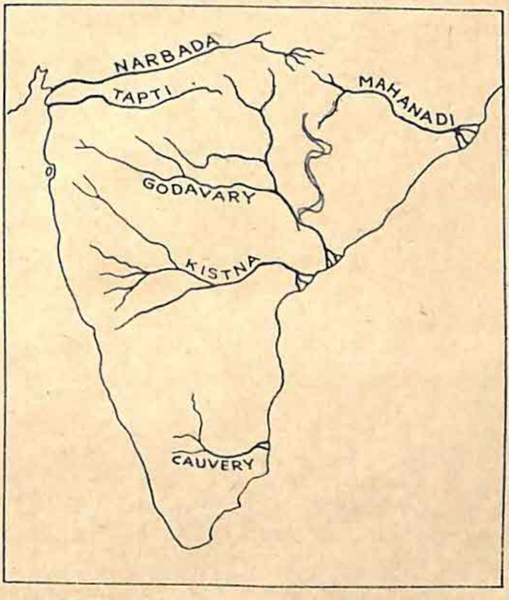
Extent. The Malwa Plateau extends from the Aravalli Range in the north-west to the Vindhyas in the south. The Deccan Plateau extends from the Tapti Valley in the north to the Nilgiris in the south.

Relief. The Narbada and Tapti have cut wide valleys in the western part of the plateau, leaving the Satpura Range and Mahadeo Hills between them. The western part of the plateau is higher than the eastern part and the surface gradually slopes from west to east. The western edge of the plateau faces the Arabian Sea like a great wall, the height of which varies from 4,000 ft. in the north to 8,000 ft. in the south. This is known as the **Western Ghats** and is not a mountain range at all, but the high edge of the plateau. The much lower eastern edge of the plateau is called the **Eastern Ghats.** The Eastern Ghats have been cut through in many places by wide valleys of rivers flowing into the Bay of Bengal. The Western and Eastern Ghats meet at the mountain knot of the **Nilgiris** in the south. South of the Nilgiris is a 25 mile wide gap in the mountains called the **Palghat Gap.** South of this rise the **Cardamom** (*elachi*) **Hills** which run almost to the southernmost point of India. There is a narrow coastal plain between the Western Ghats and the sea. Similarly there is a coastal plain between the Eastern Ghats and the sea, but the eastern coastal plain is much wider than the western one.

---

[1] Their great age is proved by the fact that no plant or animal remains (fossils) have been found in many of them.

The northern edge of the Deccan Plateau is formed by the **Satpuras,** the **Mahadeo Hills,** and the **Maikal Range.** This chain of mountains is densely forested and difficult to cross. It separates Northern India (Hindustan, *Aryabarta*, continental India) from the Deccan (*Dakkhinatya*, peninsular India). (Why are the Aryan people mostly to be found north of this line and the Dravidian people to the south? Why were there always independent kingdoms in the Deccan in the days of the Mogul emperors? Why is it that Hindustani is understood all over Northern India, but not in the Deccan? Why is the percentage of Mohammedans

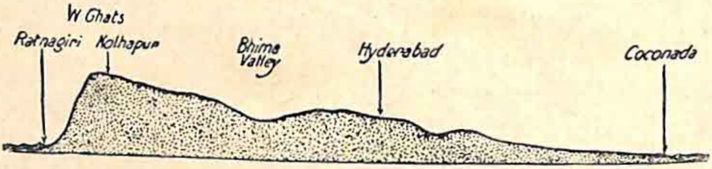


SLOPE OF THE DECCAN AS SHOWN BY THE RIVERS much smaller in the Deccan than in Northern India? Why is there no purdah in the Deccan?)

The surface of the Deccan Plateau is not a plain. It has been deeply cut through by river valleys in various directions.

Drainage. The relief of a country is shown by the directions in which the rivers flow. The north-eastern slope of the Malwa Plateau can be seen from the direction in which the rivers Chambal and Betwa, both tributaries of the Jumna, flow. The slope of this plateau to the south-west is shown by the courses of the Luni and the Sabarmati. The northern edge of the Deccan Plateau slopes towards the Indo-Gangetic Plain as shown by the course of the Sone.

Between the two plateaux, the land slopes towards the west as shown by the courses of the Narbada and Tapti. The general slope of the Deccan Plateau is from the north-west to the south-east. This is clearly seen from the directions followed by the Damodar, Subarnarekha, Baitarani, Brahmani, Mahanadi, Godavari, Kistna, Penner, Palar, Cauvery and Vaigai rivers.



DIAGRAMMATIC SECTION ACROSS THE DECCAN SHOWING THE GENERAL SLOPE TOWARDS THE EAST

The line of this section passes through the Godavari-Kistna gap in the Eastern Ghats.

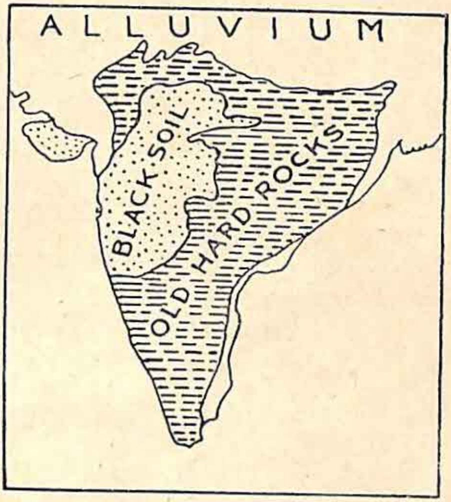
Rivers having their source near the Western Ghats fall into the Bay of Bengal. These Deccan rivers have made deep cuts in the eastern edge of the plateau, so that the Eastern Ghats is not a continuous range like the Western Ghats.

(Why has the construction of the railway line along the east coast of India been very expensive?)

Soil. The Deccan lavas have been changed in the course of ages by weathering (action of water, air and sun's heat) to form a dark heavy soil which keeps moisture for a long time. This is called the **Black Cotton Soil** as it has been found to be very suitable for cotton cultivation.

The coastal plains and river deltas mainly contain **Alluvial** soil similar to that of the Indo-Gangetic Plain.

The rest of the peninsula is covered with a **Red Soil** which has been formed from **Laterite** rocks. In many hot countries, rain water acting on rocks has changed them in the course of ages into a soft reddish brown substance called Laterite (Latin, *later*, a brick). This red soil is of poor fertility, hence a large part of the Deccan is not so productive as the alluvial Indo-Gangetic Plain.



THE BLACK COTTON SOIL AREA

Climate. The climate of the Deccan is largely determined by the monsoon winds. There is a hot, wet season from June to September when the monsoon blows from sea to land; there is a cool, dry season from September to March when the monsoon blows from land to sea. April and May are hot, dry months. Being nearer the Equator, the climate of the Deccan is generally hotter than that of the Indo-Gangetic Plain. The summers are warmer, the winters are not so cold. The coastal plains, being subject to the influence of the sea, have a very uniform climate, there being hardly any difference between summer and winter. In Madras, electric fans are used all the year round.

A large part of the Deccan, being in the rain-shadow of the Western Ghats, does not get much rain. The Coromandel Coast of Madras gets winter rain. This is due to the fact that the North-East Monsoon crosses the Bay of Bengal, takes up moisture and strikes against this part of the country. Some places in this region get more rain in winter than in summer. This is shown in the diagram on page 73.

Density of Population. We have seen before that the soil of a large part of the Deccan is not very fertile. Excepting the coastal plains, the rainfall is moderate in most parts of the Deccan, thus it is not so productive as the Indo-Gangetic Plain. A large part of the country is also covered with hills and forests. For all these reasons the Deccan is less densely populated than the Indo-Gangetic Plain.

THE FAMOUS TEMPLE AT MADURA

Important Towns. Among the important towns[1] of the Deccan may be noted: (1) **Bombay,** the important port and second largest city of India; (2) **Madras,** the third largest city of India and also an important port; it has cotton mills and leather works. (3) **Hyderabad** is the capital of the Indian state of the same name. It is the fourth largest city and the largest inland town in India. (4) **Ahmedabad** was formerly the capital of the kingdom of Gujarat. It is now the second largest cotton manufacturing town in India, having eighty-two cotton mills. (5) **Bangalore,** the largest city in Mysore, manufactures cotton. (6) **Poona** was the old Maratha capital. It has a pleasant climate, being in the rain-shadow region of the Western Ghats and having an altitude of about 2,000 ft. The Governor of Bombay spends the rainy season here. There are many nurseries in Poona. (7) **Nagpur,** the capital of the Central Provinces, is on the main line between Calcutta and Bombay. It was formerly a Maratha capital. Being situated in the black cotton soil region, it has several big cotton mills. We get oranges from Nagpur. (8) **Madura** on the Vaigai river is famous for its ancient Hindu temples and is a place of pilgrimage. It is also a cotton manufacturing town. (9) **Sholapur,** on the main line from Bombay to Madras, is an important cotton manufacturing town. (10) **Trichinopoly** on the Cauvery has a famous Hindu temple. Trichinopoly cigars are known and used all over India. (11) **Indore,** the capital of the Indian state of Indore, has cotton mills. (12) **Jubbulpore** in the Central Provinces, on the main line from Bombay to Allahabad, manufactures cotton goods and carpets. (13) **Baroda** is the capital of the Baroda State. (14) **Mysore** is the capital of the State of Mysore. It is famous for the manufacture of soap, silk and sandalwood articles, including sandalwood soap. (15) **Salem** is a cotton manufacturing town in Madras Presidency.

---

[1] These have been named in order of their population. All these cities have populations of over one lac.

The important cities of the Deccan are either ports, or cotton manufacturing centres, or capitals of Indian States.

QUESTIONS

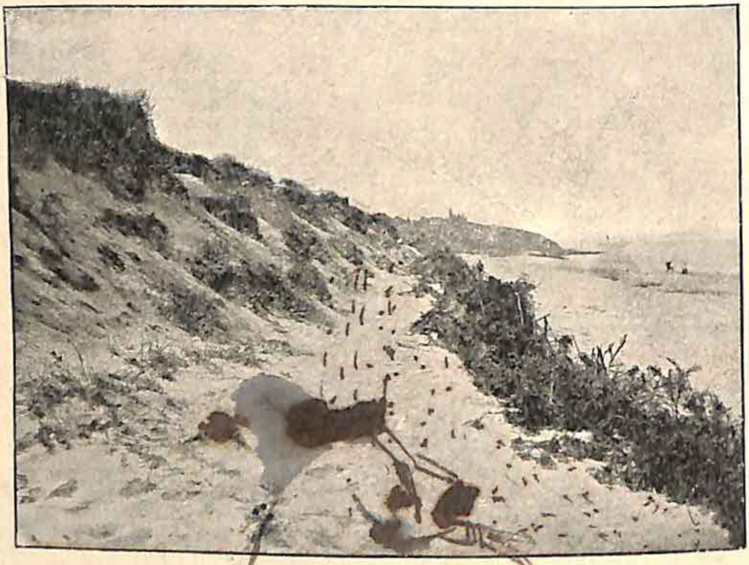
1. Explain why a railway journey across the Deccan is not so monotonous as one across the Indo-Gangetic Plain?
2. Why do most of the Deccan rivers almost dry up in summer?
3. Why are the most ancient Hindu temples to be found in the Deccan and not in Northern India?
4. Why is the lower Gangetic Valley so densely populated and the Deccan so thinly populated?

CHAPTER XVI

THE COASTAL PLAINS

Position. To the west of the Deccan Peninsula there is a narrow coastal plain between the Western Ghats and the Arabian Sea. There is also a similar, but much broader, coastal plain between the Eastern Ghats and the Bay of Bengal.

Extent. The Western Coastal Plain is about 1,000 miles long, but only 30 to 40 miles wide. The Eastern Coastal Plain is about 1,500 miles long and about 100 miles wide. The southern half of the Western Coastal Plain, south of Goa, is called **Malabar.** The northern part, from Goa to Bombay, is called **Konkan.** The Eastern Coastal Plain is also divided into two parts: the southern half up to the Kistna Delta is called the **Carnatic**, the shore line being called the **Coromandel Coast.** The northern half, between the Kistna and Mahanadi deltas is called the **Northern Circars.**

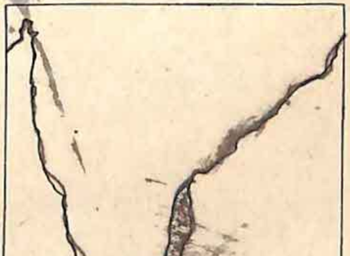


SAND DUNES

Origin. The coastal plains have been formed of the materials brought from the western and eastern parts of the plateau by rivers. The South-West Monsoon strikes against the Western Ghats, causing a very heavy rainfall (over 100 in.) in the mountains. This gives rise to a large number of small streams which flow down from the Western Ghats to the Arabian Sea. All these rivers bring down stones, clay and sand from the mountains, which are spread out at the foot of the hills. The water of the small rushing streams from the Western Ghats is prevented at many places from reaching the sea by the heaps of sand on the shore. The water accumulates and forms large shallow **Lagoons.** Many of these lagoons communicate with the sea and are deep enough to form harbours for country boats. In the southern part of the Western Coastal Plain, i.e. Malabar, the lagoons have been connected by canals, and it is possible for country boats to travel hundreds of miles through these canals. Such voyages can be made even at the time of the South-West Monsoon when the sea is very rough.

The waves of the sea dash against the coast and large quantities of sand are piled up by the shore. Thus, at the foot of the Ghats, there is a strip of flat alluvial land, and near the seashore there are sand dunes or small hillocks of sand. In the Eastern Coastal Plain, the rivers are much larger and bring enormous quantities of silt and have formed deltas at their mouths.

Coast Line. Peninsular India has an almost unbroken coast-line. Only Bombay and Goa have natural harbours. Other harbours, like Cochin, are situated on lagoons and allow only small boats to enter. The coast is low, sandy and flat. The sea near the coast is shallow and, with the exception of Bombay and Goa, there are no natural harbours in the 2,500 miles long Deccan coast-line where ships can take shelter. In many places steamers have to anchor two or three miles from the shore and goods have to be brought by small country boats through the surf to the land. In some parts of the coast there is a sand-bank or mudbank about a mile or two from the shore and the big waves beat on this and their full force does not reach the shore. The river mouths are shallow and silted up and do not allow ships to enter. Excepting the Island of Bombay, there are hardly any islands near the coast. Owing to the unbroken nature of the coast-line, the shallow sea near the shore, the absence of islands



THE PART OF THE DECCAN THAT GETS MORE RAIN IN WINTER THAN IN SUMMER near the coast, and the rough sea caused by the South-West Monsoon during half the year, the people of the Deccan have never been a great sea-faring people. (Compare Japan and England.)

Rainfall. The Western Coastal Plain is a very wet region. In many parts the rainfall is over 100 in. annually. This is due to the fact that the rain-bearing South-West Monsoon from the Arabian Sea strikes directly against the high Western Ghats, causing heavy rainfall. The Carnatic is in the rain-shadow region of the Cardamom and Nilgiri Hills and has a small rainfall in summer from the South-West Monsoon. From October, the North-East Monsoon starts blowing over the Bay of Bengal, storms occur on this coast and heavy rain falls. In this region, more rain falls in winter than in summer, the total rainfall being about 40 in. In some years, much less rain falls, and there are thousands of irrigation tanks in the Carnatic to supply water to the fields. The Northern Circars gets summer rain from the South-West Monsoon. The winds blow parallel to the coast and rainfall is not much—less than 40 in. in the year.

COCONUT PALMS ON THE MALABAR COAST

Chief Products. In the Western Coastal Plain, the shores of the lagoons or backwaters are lined with coconut plantations. Every bit of available land is cultivated, and rice is grown abundantly. Areca nuts (*supari*) are also largely grown. Pepper (*gol mirch*) is an important product of Malabar. Coconut fibre (*coir*) and copra (dried coconuts) are largely exported. The best coconut oil comes from Cochin. Note that coconuts grow on sandy shores, but where the coast is muddy there are mangrove swamps. Fishing is an important occupation of the people living by the seashore. There are pearl fisheries in the Gulf of Manar.

EXTRACTING COPRA FROM COCONUTS

In the Carnatic and the Northern Circars, **Rice** is the most important crop and is grown on irrigated land. Where rainfall is small, i.e. less than 40 in. in the year, **Millet** is the chief crop. In the drier regions **Cotton, Ground-nuts** and **Tobacco** are grown. **Sugar-cane** is cultivated with the help of irrigation. All along the sandy coast there are **Coconut** plantations. **Fish** and **Salt** are obtained from the sea. (Why cannot salt be obtained on the west coast ? What is the advantage of getting salt from the sea where large numbers of fish are caught ?)

Density of Population. Because of its great fertility, the western coastal region is very densely populated. Cochin has a density of population of 815 per square mile. Parts of Travancore have the highest density of population in India—1,200 per square mile. In the Carnatic, the population is over 400 to the square mile; in the Northern Circars the density of population is 345 to the square mile. (How do these figures compare with the density of population of your own province?)

Comparison of East and West Coasts. Both the coastal plains have been formed in the same way. The Western Coastal Plain is narrow, the Eastern Coastal Plain is much wider. The coast-lines are mainly unbroken on both sides; there are two natural harbours on the west side, but none on the east. Rainfall is very heavy on the west coast and is mainly derived from the South-West Monsoon. Rainfall is moderate on the east coast and irrigation is necessary. The Carnatic gets more rain in winter from the North-East Monsoon than in summer. Rice and coconuts are grown on both the coastal plains and large quantities of fish are caught from the sea. In the drier parts of the Eastern Coastal Plain, tobacco, ground-nuts, cotton and millet are grown. Salt is obtained from the sea in the Eastern Coastal Plain only. The Western Coastal Plain is far more densely populated than the Eastern Coastal Plain.

Important Towns. There are not many important towns in the coastal plains. **Bombay** is the most important port. **Madras** has an artificial harbour. It manufactures cotton and leather. **Madura** is famous for its Hindu Temple. It is a place of pilgrimage. There are cotton mills here. **Trichinopoly** is famous for its cigars. There are also ancient Hindu temples here. **Salem** is a cotton manufacturing town.

Among smaller towns may be mentioned Goa which has a natural harbour. It belongs to the Portuguese. Mangalore is the terminus of a railway line from Madras through the Palghat Gap. Cannanore is famous for its cotton manufacture. Calicut is the port where Vasco da Gama landed in 1498. Cochin stands on a large lagoon or backwater, the mouth of which was blocked by a sand bar. A passage has now been cut through the bar and ships can enter the lagoon. The port of Pondicherry is the capital of the French possessions in India. Vizagapatam is situated in front of a gap in the Eastern Ghats. An artificial harbour has been made here and the port is the natural outlet for the products of the Central Provinces. A railway joins Raipur in the Central Provinces with Vizagapatam.

Coastal Trade. Small steamers and country boats carry goods from seaside towns where there are no harbours and large ships cannot enter, to the big ports like Bombay or Madras. You will be able to find the names of many such places[1] on the map.

3rd quar

QUESTION

1. Explain why the railway line from Calcutta along the Eastern Coastal Plain was very costly to build.

CHAPTER XVII

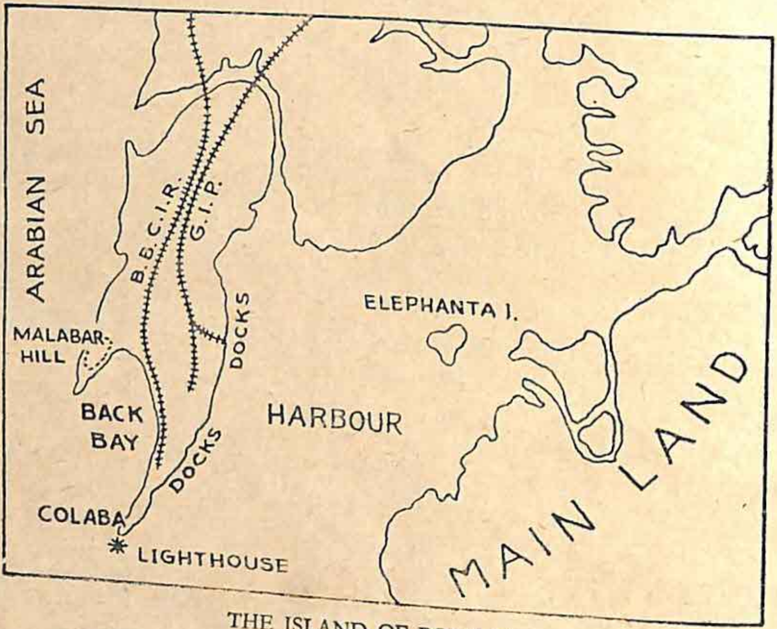
BOMBAY

BOMBAY, the chief seaport of Western India, stands on a small island which has now been connected with the mainland. The southern part of the island is divided into two peninsulas, Colaba Point and Malabar Point; the latter is the residence of the Governor of Bombay. Between the two peninsulas lies Back Bay. There is a scheme for filling up part of this bay and adding 1,000 acres of land to the city. (Why is the price of land much greater in Bombay than it is in Calcutta?) On turning round Colaba Point, ships enter a fine large harbour between the island and the mainland. It is the finest natural harbour in India. Nearly 40 per cent of the total trade of India passes through Bombay. It is the chief port of the cotton growing Black Soil region of the Deccan and also exports cotton goods manufactured in the city and the neighbouring country. It is also the port at which passengers coming from

---

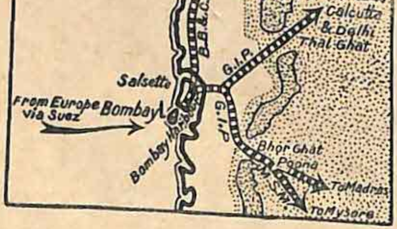
[1] Puri, Gopalpur, Calingapatam, Bimplipatam, Coconada, Masulipatam, Cuddalore, Negapatam, Tuticorin, etc.

Europe to India land. (Why is Bombay called 'the Gateway of India'?)



THE ISLAND OF BOMBAY

The port of Bombay has three well-equipped **Docks** and two large dry docks. These are connected with the mainland by the Great Indian Peninsular Railway line. In the Harbour of Bombay is **Elephanta** Island, famous for its rock-cut temples.

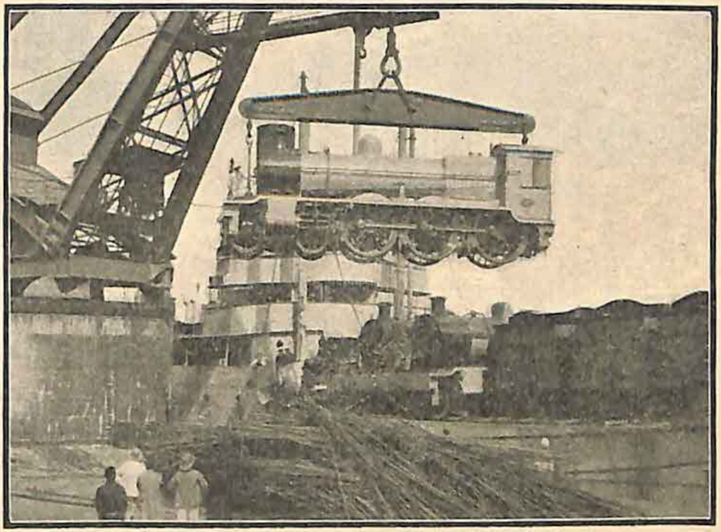


SKETCH MAP SHOWING THE SITUATION OF BOMBAY
(Dotted area represents the plateau.)

Communications. The Great Indian Peninsular and the Bombay, Baroda, and Central India Railways start from Bombay. The G.I.P. line connects: (1) Bombay with Allahabad; (2) Bombay with Nagpur, and then by the Bengal Nagpur Railway one can go to

Calcutta. This is very important, being the shortest route from Bombay to Calcutta. (3) Bombay with Raichur, and then by the Madras and Southern Mahratta Railway one can go to Madras. The B.B. & C.I.R. connects Bombay with Delhi.

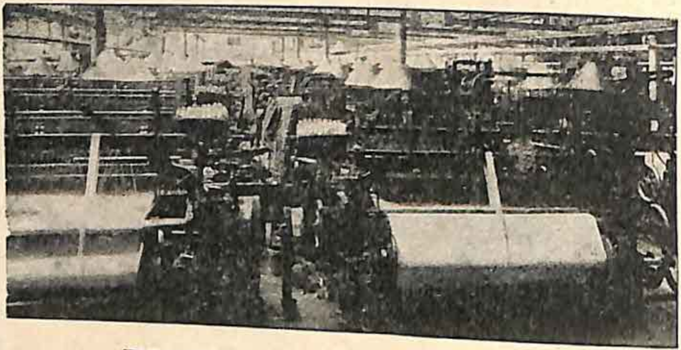
Manufactures. Bombay is the most important cotton manufacturing city of India. There are eighty-five cotton mills in Bombay. Cotton is grown in the neighbouring region and the mills are run by cheap electricity from water power in the Western Ghats.



UNLOADING LOCOMOTIVES AT BOMBAY DOCKS

Bombay is also famous for its manufacture of silver ware.

Growth of Bombay. Bombay is the second largest city in India and owes its growth to the following causes: (1) It has a fine natural harbour affording shelter to many ships at a time; (2) It has excellent means of communication with the interior of the country; it is joined to Delhi, Calcutta and Madras by railways; (3) The mountains of the Western Ghats have a heavy rainfall, some of which is stored, and the water flowing down the hill is used to produce cheap electricity: this has made Bombay an important industrial centre in spite of the absence of coal; (4) Bombay is near the great cotton-growing region of India. (Why is it that a man from Calcutta going to England prefers to go to Bombay and get his ship there and not take the boat from Calcutta? Why has Bombay been called the Liverpool of India? Can it also be called the Manchester of India?)



WEAVING LOOMS IN A BIG FACTORY

A VIEW OF BOMBAY

On the right the G.I.P. Railway Offices, and on the left the Municipal Offices.

Education. The University of Bombay was founded in 1857, so it is as old as the Calcutta University. The Government maintain three Arts Colleges, a Medical College, a Law College, an Agricultural College, a Veterinary College, a School of Art and a College of Commerce in Bombay. Besides these, there are two Missionary and several private Colleges.

A VIEW OF ONE OF THE MAIN THOROUGHFARES OF BOMBAY

Population. Over eleven lacs of people live in Bombay. As Bombay is an island it is not possible for the city to expand. So many people live outside, but are daily passengers to the city.

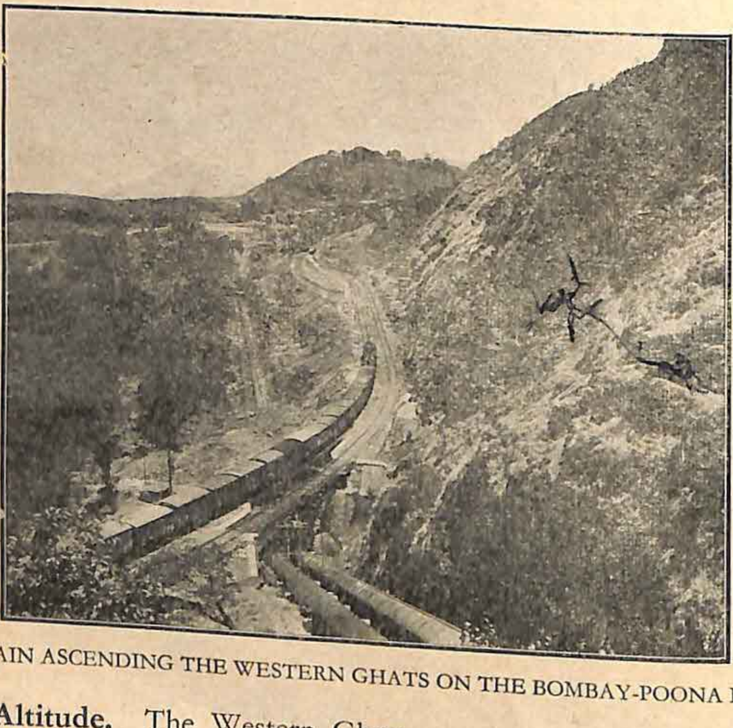
QUESTION

1. Has India many or few ports for its size ?

CHAPTER XVIII

THE WESTERN GHATS

Position. The Western Ghats, the *Sahyadri* of Hindu geographers, are the western edge of the Deccan Plateau. They are not fold mountains like the Himalayas. They rise abruptly from the Western Coastal Plain and run from the south of the Tapti to the Palghat Gap, a distance of nearly 900 miles.

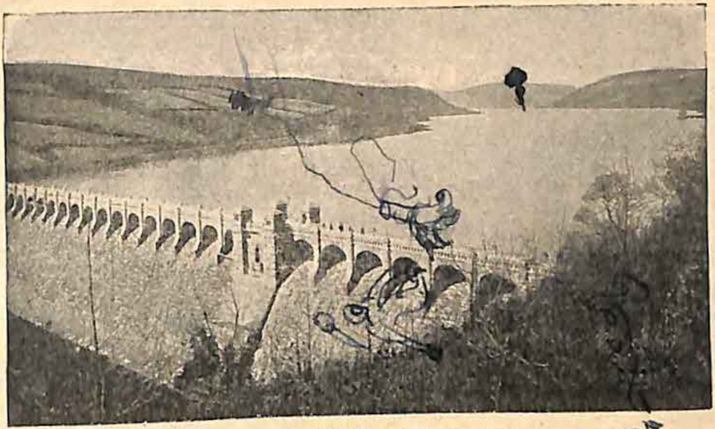


TRAIN ASCENDING THE WESTERN GHATS ON THE BOMBAY-POONA LINE

Altitude. The Western Ghats are 4,000-5,000 ft. high near Bombay and 7,000-8,000 ft. high in the Nilgiri Hills in the south where the Eastern and Western Ghats meet. The Western Ghats are very difficult to cross. They have been penetrated only in three places by railway lines: (1) the **Thal Ghat** (1,941 ft.) pass near

Nasik, through which the G.I.P. line from Bombay to Nagpur passes; (2) the **Bhor Ghat** (1,804 ft.) pass near Poona, which allows the line from Bombay to Madras to pass; (3) near Goa.

A Great Watershed. The Western Ghats act as a great watershed. All the rain falling on their western slopes flows by short and swift rivers into the Arabian Sea. The rain which falls on the eastern side finds its way to the Bay of Bengal by one or other of the great Deccan rivers (Godavari, Kistna, Cauvery).

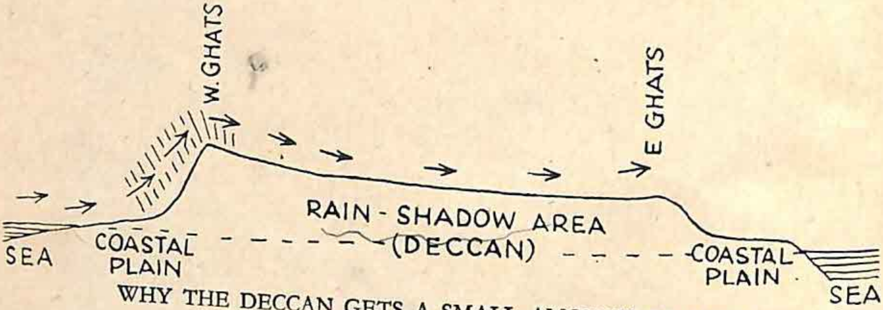


THE DAMMING OF A RIVER

Sources of Rivers. The **Godavari,** the **Kistna** and its tributaries the Bhima and Tungabhadra, and the **Cauvery** have their sources in the Western Ghats. There are many short and swift rivers that flow down the western slopes of the Ghats to the Arabian Sea. They are not used by boats, being too swift and rocky, but are used for floating logs of timber from the forests on the mountain slopes to the coast. In the future, some of these rivers may be dammed and the water used to generate electricity (hydro-electricity) cheaply.

Courses of Rivers on Each Side. The directions in which the rivers that rise in the Western Ghats flow show the slope of the Deccan Plateau. The Godavari, the Kistna and the Cauvery flow south-east to the Bay of Bengal. The small streams that have their sources on the western slopes of the Ghats flow into the Arabian Sea.

Rainfall. Rainfall is very heavy on the Western Ghats, amounting to over 100 in., as they are right across the path of the South-West Monsoon. The moist wind, blowing from the Arabian Sea, strikes the Western Ghats. The wind is compelled to rise, is cooled and heavy rain falls. When the wind has crossed the Ghats, it descends to the level of the Deccan Plateau, becomes warmer and gives only a small amount of rain to the Deccan. The part of a country which lies on the leeward side of a mountain and is thus prevented from getting much rain is called a **Rain-shadow region.** The Deccan lies in the rain-shadow region of the Western Ghats. The difference in the rainfall between places, having nearly the same latitude, but lying on the windward and leeward sides respectively of the Western Ghats will be seen from the following table :—



WHY THE DECCAN GETS A SMALL AMOUNT OF RAIN

West Coast	Rainfall	Deccan	Rainfall
	inches		inches
1. Trivandrum..	65	Palamcottah ..	28
2. Cochin ..	115	Madura ..	34
3. Calicut ..	117	Coimbatore ..	22
4. Mangalore ..	126	Bangalore ..	35
5. Karwar ..	120	Bellary ..	21
6. Goa ..	95	Kurnool ..	26
7. Ratnagiri ..	100	Hyderabad ..	32
8. Bombay ..	71	Ahmednagar ..	22

Climate on Eastern and Western Sides of the Range. We have seen before that the West Coast Region has a very heavy rainfall. Being near the sea, the range of temperature (i.e. the difference between summer and winter temperatures) is also very small, as the sea keeps the land cool in summer and warm in winter. Places having a heavy rainfall are also often cloudy, so that the sun's heat is not much felt. In Bombay, the difference between summer and winter temperature is 10°, in Malabar it is even less, being only 5°. This means that the climate is more or less uniform throughout the year, there being hardly any difference between summer and winter.

The eastern side of the Western Ghats gets a small amount of rain—less than 40 in. Being far from the sea, there is greater range of temperature, of about 15° to 20°, than in the coastal region; but the range is not so great as in Northern India.

CHAPTER XIX

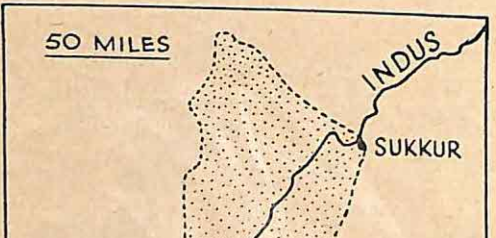
SIND

Position. Sind is a very dry alluvial plain, forming the valley of the Lower Indus. It lies between the Baluchistan Plateau on the west, and the Thar Desert on the east. North to south, it extends from the Punjab to the Arabian Sea. It now forms part of the Bombay Presidency, but will be a separate province soon.

Rainfall. Sind is a very dry area. Large parts of it get less than 5 in. of rain in the year. The highest amount of rainfall occurs near the coast, Karachi getting 8 in. Naturally it is a desert, but agriculture is carried on with the help of irrigation canals from the Indus which runs through its centre. Egypt in Africa has been called the 'Gift of the Nile' because it is a desert country which has been made fertile by the waters of the river Nile passing through it. Similarly, one may call Sind the 'Gift of the Indus'.

Sind does not get any rain from the South-West Monsoon for the following reasons: (1) It does not lie directly in the path of the monsoon; (2) There are no mountains here to check the moist wind which may come from the Arabian Sea; (3) In blowing over the hot dry plains of the Lower Indus Valley, the sea breeze becomes drier and no clouds can be formed.

Temperature in Hot and Cold Seasons. Sind, having a rainfall of about 4 in. in the year, is a desert country. The climate is of the extreme type, such as is found in very dry countries—very hot in summer and cold in winter. The range of temperature is very great, the difference between summer and winter temperatures being nearly 40°. Jacobabad in Sind has recorded a maximum temperature of 126° in summer, which is the highest temperature recorded in India.



CANAL-IRRIGATED AREA IN SIND

Nature of Soil. The whole of Sind is an alluvial plain made by the Indus. At different times the river has flowed through different channels, and as the Indus floods during the melting of the mountain snows from May to August, silt has been widely spread over the whole area.

Rivers and Canals. Their Effect on Fertility of Soil. The extremely small rainfall of Sind makes it impossible for crops to be grown without irrigation. Those parts of the country where no irrigation is possible are barren deserts. From 1932 Sind has been provided with an extensive system of perennial canals from the Indus. A great dam, a mile long, named the **Lloyd Sukkur Dam,** has been built across the Indus a little below Sukkur, and much of the water which formerly flowed to the sea is stored to supply seven great irrigation canals, four on the east and three on the west. (See page 89.) With the help of these canals wheat, cotton and millets are now grown in 6,000,000 acres of Central Sind, where nothing grew before. Cotton and wheat are now important exports of Sind from the port of Karachi.

Density of Population. The density of population of Sind is only 66 per square mile, that is, one-tenth of that of Bengal. But the population is sure to increase rapidly in future with the extension of cultivation in the areas now irrigated by the new canals.

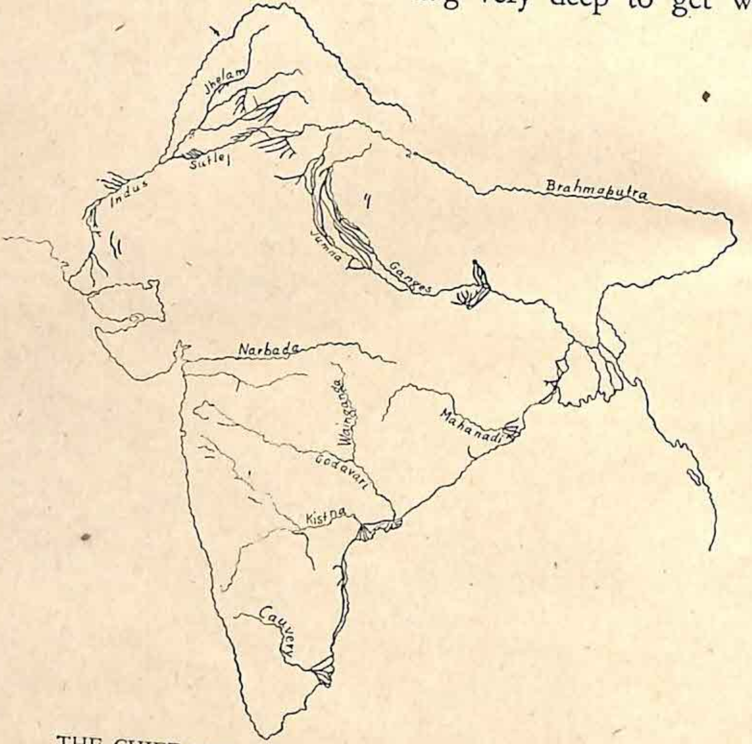
CHAPTER XX

AN IRRIGATED AREA

PLANTS can grow only where the soil is moist. The watered soil contains salts in solution, and is absorbed by the roots of plants and serves as their food. Thus, agriculture is possible only where the soil is kept moist either by frequent rains, or where water can be supplied by man. Where no water is available, there can be no vegetation, and the land becomes a desert. In some areas of India, where rainfall is heavy, no artificial watering (irrigation) of the fields is necessary. Thus, Bengal, Assam, Southern Burma and the Western Coastal strip depend on monsoon rains which are sufficient for the purposes of agriculture in these parts. On the other hand, the Indus Valley (the Punjab, Sind), the Upper Ganges Valley (United Provinces) and the whole Deccan lying in the rain-shadow of the Western Ghats do not receive enough rain for the growing of crops. The rainfall is also uncertain in these areas, varying from year to year. It is necessary to water the fields in these parts if crops are to be raised. Various methods of irrigation are practised in India, the most important of which will be described here.

1. **Wells.** Some of the water that falls on the surface of the earth as rain sinks underground, and is prevented from going very deep by the presence of non-porous layers of clay. Thus, the water is stored at varying depths from the surface and can be reached by

sinking wells. Irrigation with water from wells has been done in India for thousands of years. Wells are most numerous in the Upper (United Provinces) and the Middle (Bihar) Ganges Valleys. The soil is a soft alluvial clay in these parts and wells can be dug cheaply. In the Punjab the wells have to be dug very deep to get water throughout the year, and so are costly. In the Deccan Plateau, the subsoil is rocky and wells are difficult to dig. Especially is this the case in Chota Nagpur and the Santal Parganas.

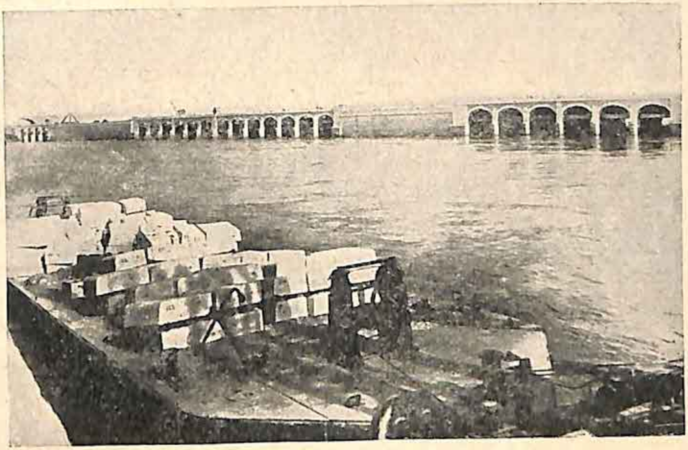


THE CHIEF IRRIGATION CANAL WORKS OF INDIA

2. **Canal Irrigation** is also extensively made use of in India. There are two types of canals in use: (1) The older **Inundation Canals** by which the surplus waters of rivers in flood during the rains are carried away to irrigate the fields. They are not of much

use as they are dry in summer when water is most needed.[1] (2) The modern **Perennial Canals** are made to supply water all the year round. A dam is built across the course of the river, and this serves to hold up the water which would otherwise have made its way to the sea. This stored water is slowly released, whenever necessary, to irrigate the fields. Thus, water is supplied by perennial canals even when the river is at its lowest.

The lands between the rivers (doabs) of the Punjab are irrigated from perennial canals. The Jhelum, Chenab, Ravi and Sutlej all supply water to numerous canals. Thus, land which formerly produced nothing has now been converted into an important wheat growing region. The population of these 'canal colonies' has increased enormously in recent years.

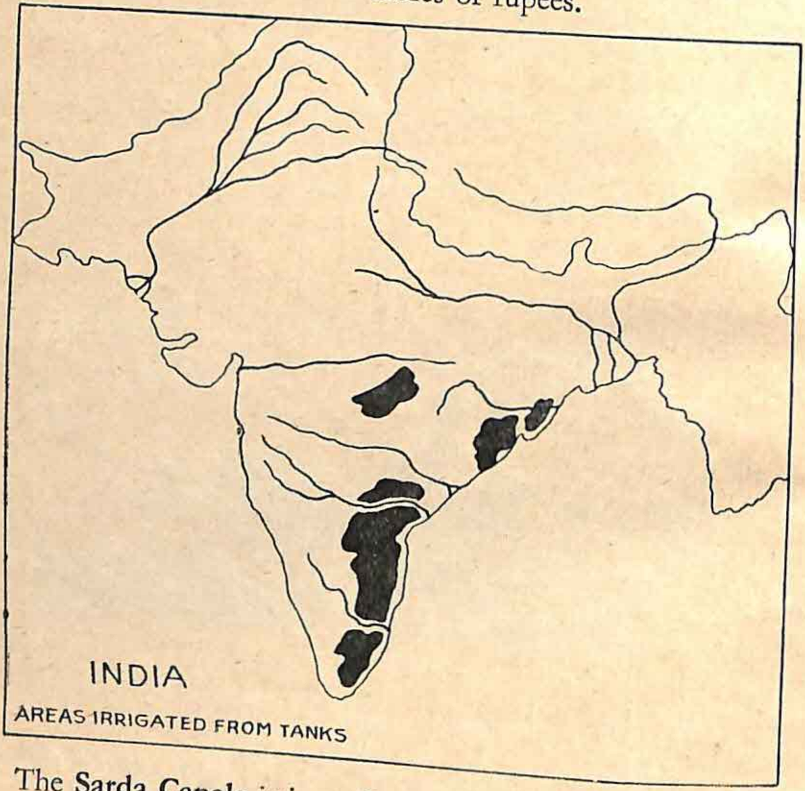


SUKKUR: THE LLOYD BARRAGE
This barrage or dam over the River Indus has enabled a vast area of hitherto desert land in Sind to raise crops.

The latest important irrigation scheme will benefit Sind greatly. A great dam has been built across the Indus, near Sukkur. During the rainy season, the water flows through gates in the dam, but at other times the gates are closed. This raises the level of the river water behind the dam by 15 ft. Large canals on either side irrigate eastern and western Sind. The dam has been named the **Lloyd Sukkur Dam** after Lord Lloyd, who was Governor of Bombay when the project was started. The total cost of building the dam and digging the canals was 20 crores of rupees.

---

[1] In South Bihar inundation canals are called *pynes*.



AREAS IRRIGATED FROM TANKS

The **Sarda Canals** irrigate Oudh. There are also canals in the deltas of the rivers Mahanadi, Godavari, Kistna and Cauvery. The Ganges and Jumna Canals irrigate the United Provinces doab. The **Sone Canals** supply water to south Bihar, west of Patna. The Tribeni Canal irrigates the Champaran district and obtains its supply from the river Gandak just where it comes out of the hills.

3. **Tanks.** It has been mentioned before that it is costly to bore wells in the rocky Deccan Plateau. The rugged surface of the

plateau is also not suited for irrigation canals. (Why ?) The people of the Deccan have from time immemorial irrigated their fields from tanks. These are artificial lakes made by damming river valleys. In some places, these dams are of gigantic size and are marvels of engineering.

Wherever possible, various water-raising devices are made use of by villagers to irrigate their fields from a small neighbouring stream.

In some places in South Bihar, the rainfall is stored in embanked fields called *aharas* and this stored water is utilized to grow crops on fields situated below the *aharas* when the rainfall is deficient towards the end of the rainy season. This method, however, fails when rainfall is insufficient during the early part of the monsoon.

QUESTIONS

1. Why is irrigation essential in most parts of India ?
2. In what parts of India are canals most numerous ? Why are they most numerous there ?

CHAPTER XXI

FORESTS

DENSE forests (**Equatorial Forests**) are found in those parts of the country which are thinly populated and have a heavy rainfall. Such areas are to be found in the Western Ghats, Assam, Burma and the southern slopes of the Himalayas (Terai). Less dense forests (**Monsoon Forests**) are to be found in the drier regions of Central India. Stunted **Babool Forests** are found in some parts of the Punjab.

Economic Importance of Forests. We get many useful things from our forests. Our most important **Hard Woods** are teak, *sisoo* (*sisam*) and *sal*. Teak is obtained from the forests of the Western Ghats, Burma and the Central Provinces. *Sal* is obtained from the eastern part of the Himalayan Terai and the Central Provinces. These woods are used for making furniture, beams, rafters, doors, windows, railway carriages and sleepers, country boats and all other purposes where a hard, durable wood is required. Teak is largely used for shipbuilding. It takes a good polish and is not attacked by white ants (*dia*). *Sisam* is used by people who cannot afford the higher priced teak. It is a dark coloured wood. *Sal* is a heavy wood: it does not take polish well, and is generally used for rough work. Mango is a light, pale-coloured, cheap wood, and is easily attacked by insects. It is used by people who cannot even afford to pay for *sisam*. If you remember these points, you will be able to know which articles in your home or school are made of teak, which of *sal*, and which of *sisam*.

EQUATORIAL FOREST

(Compare this with the illustration on page 19 and notice the same type of dense vegetation.)

In the Himalayas, at a height of 5,000 ft. and over, are forests of cone-bearing trees—firs, pines, cedars, *deodars*. These trees give a **Soft,** light **Wood.** Most of the packing boxes are made of this soft wood. You will get an idea of soft wood if you examine one of the boxes in which kerosene oil tins are packed. These soft woods are in great demand for tea chests, cigar boxes, pencils (cedar), matches and paper making. But as the cone-bearing trees grow mostly in inaccessible mountainous places, it is difficult to bring them to the plains where they are required. Turpentine (*tarpin*) and rosin (*rajan*) are obtained from the pine tree, and chips of pine wood are used as incense (*homad*). *Dhuna* is a gum-like substance obtained from the *sal*.

Ornamental Woods such as ebony (*ablus*) and rosewood are obtained from the forests of the Western Ghats. The former is deep black, and the latter deep red in colour. Sandalwood grows in the Deccan south of the Godavari, mainly in Mysore. It is the costliest of all woods and is sold by weight.

Khair or catechu (*kath*) grows in the lower slopes of the Himalayas in the United Provinces. The gum obtained by boiling the wood is used with lime in *pan*.

Babool which grows in the dry forests of the north-west yields gum arabic and a tanning material. Any of you who may have travelled by the B. & N.W.R., between Katihar and Cawnpore must have noticed the *babool* trees planted on both sides of the railway line.

The bamboo is a very useful forest product. You must be familiar with its use in thatching houses, making scaffoldings, ladders, fences, baskets and screens (*chicks*). It is also used for paper making. The palm tree yields a sweet juice which is fermented to form toddy, a light wine much used by poorer people. The date palm does not yield a good fruit as it does in desert countries, but a nicely flavoured *gur* is made from its sweet sap, in Bengal. The coconut palm only thrives in sandy soils near the sea. It is very largely grown along both the eastern and western coasts of Peninsular India. The finest coconut oil (cocogem) comes from Cochin in the Malabar Coast. It is the best vegetable oil for soap making.

Mahua grows extensively in Chota Nagpur. Its flowers are used for making country wine. The common Indian roadside trees, *pipal* and *bar*, are of no use whatsoever. The wood of these and other useless trees may be used as fuel and for making charcoal.

Various **Medicinal Plants** also grow wild in the forests. Mention may be made of *chiretta*, aconite, belladonna, and nux vomica (*kuchila*). Many of these are grown on the cooler Himalayan slopes. Various useful grasses like *munj* and *sabai* are also found in the forests. The former is used for making ropes, and the latter, collected from the Rajmahal Hills, is used by the Bengal paper mills. Some others are used for thatching houses in villages.

Forest Protection and Management. Unless steps are taken to regulate the cutting down of trees, a forest is likely to be destroyed by people in course of time. The Forest Department of the Government of India has the task of protection and management of forests. Many forests have been saved from ruin by the work of the officers of the Forest Department. A little less than one-fourth of the area of the Indian Empire is still covered with forests. The Forest Department decides on the number of trees to be cut down each year, plants new trees to take the place of those that are cut down, regulates the grazing of animals like goats (which destroy young trees) in forests, and sells the forest produce. Apart from the fact that forests are a source of income to the State, rainfall diminishes when forests are cut down. So, protection and management of forests are necessary.

We make a net profit of over two and a half crores of rupees from our forests annually.

CHAPTER XXII

COTTON CULTIVATION AND MANUFACTURE

Cotton is the most important money crop of India. The cultivator grows rice, wheat or pulses for his own food and sells only the surplus. But cotton is grown for the money it brings. It requires only a moderate rainfall, and there must be dry sunshiny weather when the pods ripen or the cotton will be spoilt. The largest cotton growing area in India is the north-western part of the Deccan Plateau, where the famous Black Cotton Soil is found. This area includes the Kathiawar Peninsula, Gujarat, Northern Bombay, and Central India. In all these areas, rainfall is small, but the stiff black clayey soil holds moisture for a long time. With the help of canal irrigation, cotton is grown in the United Provinces, the Punjab and Sind. (Why is not cotton grown in Bengal ?) Raw cotton is the most important export of India.

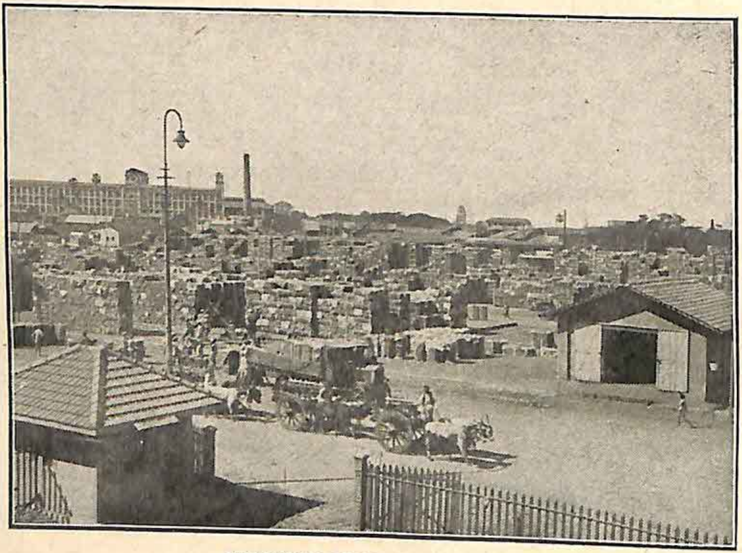
Cultivation and Picking. The cotton plant grows to about the height of a man. It produces a yellow flower, and when the petals fall, a green pod is left behind. Later on, these pods burst open and show a mass of white fibre with black round seeds inside. Cotton has to be carefully picked by hand (as in the case of tea) and thus it can only be grown profitably where there is a good supply of cheap labour.

Manufacture. When cotton has been collected from the fields, the seeds have to be separated from the fibres (ginning). This is done by a machine called the cotton gin. Next, the fibres are twisted into thread (spinning) by other machines, and finally the thread is woven into cloth in weaving mills. In India, some amount of hand spinning by *charka* is done, and hand-weaving by looms is an industry in many villages. In former times, all the three processes of ginning, spinning and weaving had to be done by hand labour and so the manufactured cotton was not so cheap as it is now when machinery is employed.

SCENE IN A LARGE COTTON MILL

Here the cotton is in the final stage of spinning and being wound round the bobbins, ready for weaving.

Cotton Weaving as a Handicraft. India is the birthplace of cotton manufacture, and cotton spinning and weaving have been carried on here from the earliest times. The hand-woven Indian muslin was exported to Europe and sold there at a high price. But now, with the improvement of machinery, it is difficult for hand-made cotton to compete with the products of the mills. The total number of cotton mills in India at the present time is 352. Of these, Bombay has the largest number, 85. Ahmedabad has 82, Madras 32, Bengal 22. Cotton mills are to be found in all the provinces of India, excepting Bihar and Orissa.



COTTON DEPOT, BOMBAY

Cotton Seed. Cotton, as it comes from the plant, contains two-thirds of its weight in seed. There was no use for this cotton seed and it was simply thrown away. Now, the seed obtained from the cotton gins is crushed between heavy rollers and an oil is pressed out. This cotton seed oil is used for mixing with other vegetable oils, and also in soap making. The residue, after the oil has been pressed out, can be used for feeding cattle. The sale of cotton seed oil and oil-cake serves to reduce the price of cotton.

America produces the largest amount of cotton in the world. The yearly production of cotton in India is about 3,00,00,000 maunds.

CHAPTER XXIII

TEA CULTIVATION

THE tea plant grows wild on the Assam hills. It has been cultivated and used in China for many centuries, but in India its cultivation was started by English planters eighty years ago. It thrives in a cool climate having frequent rains. But the soil must not hold a large amount of moisture as the tea plant is injured if water is allowed to remain about its roots. The lower slopes of the Himalayas (Darjeeling Hills) and the hills north and south of the Brahmaputra Valley have been found to be favourable for the growth of the tea plant, as rainfall is heavy in these parts, and elevation makes the climate cool. For the same reason, the Nilgiris are also suitable for tea cultivation. The greater the elevation at which tea can be cultivated the finer the flavour. Thus tea grown on the Darjeeling Hills at an altitude of 5,000-7,000 ft. is of finer flavour than Assam tea.

TEA PICKING

Method of Cultivation and Preparation. Where tea is grown, the sloping hillside is covered with close regular rows of carefully planted tea bushes. Women and young girl labourers in the tea gardens pick the tea leaves, while the male labourers do the harder work of draining the roots of the plants, so that water may not collect at that place in spite of heavy rainfall. They also plant young trees and prune them when necessary. Those who pluck the leaves are very skilful in their work. Only the young buds with a fine leaf or two are picked, and they must know exactly the right buds and leaves to gather, and place them quickly in round wicker baskets. The tea bushes have to be picked over once every fortnight. If allowed to grow, the tea plant would be 15 to 20 ft. high, but by picking and careful pruning they are kept flat-topped and only about 3 ft. high. When the baskets are full, they are taken to the factory and the leaves spread out and allowed to dry for twenty-four hours. After this, they are passed through rollers which squeeze them, and are then allowed to ferment for some time. Next they are dried by currents of hot air until the leaves turn black as we see them in the packets. The dried leaves are then classified according to quality by being passed through sieves having holes of different sizes and named Orange Pekoe, Pekoe, Fanning, dust tea, etc. (Can you say why all these names are Chinese?)

Value of Export. The value of tea exported from India in 1933 was 17 crores of rupees. 60 per cent of the total output comes from Assam and 14 per cent from Southern India.

CHAPTER XXIV

JUTE CULTIVATION

JUTE requires a warm moist climate similar to that which is favourable for the growth of rice. It is grown largely in Eastern Bengal where the soil is renewed every year by a fresh deposit of silt in the rains when the rivers overflow their banks. Jute is a special crop of India as it is not grown anywhere else in the world. More than half the jute grown in Bengal is exported. Large quantities are sent to **Dundee** in Scotland and used there for the making of jute bags (gunnies, sacking), hessians (gunny cloth), canvas, tarpaulins, matting, cheap carpets, linoleum, etc. Germany, the United States and France are also large buyers of raw jute. Gunny bags and hessians made in the jute mills of Calcutta, Howrah and Serampore are purchased by many countries of the world for packing wheat, cotton, rice, oil seeds, pulses, coffee, cocoa, sugar, cement, ground-nuts, wool and other raw materials. (Why has jute been called 'the brown paper of commerce'?) There are about seventy-five jute mills in Bengal, employing nearly three lacs of people. India exports raw jute worth about 10 crores and manufactured jute (gunny bags, gunny cloth) worth about 22 crores of rupees annually.

As jute brought ready money to the cultivator, the Bengal farmer gradually reduced the cultivation of rice and used the land for growing jute. Things went on well so long as the amount of jute produced could be readily sold. But in recent years, there has been an over-production of jute and its price has gone down very much. The Government are now trying to reduce the area given to the cultivation of jute so that the supply may not be greater than the demand in the world market. It has been suggested that the land released from the cultivation of jute should be used for growing sugar-cane, which is also a ready-money crop.

In 1935 the area to be planted with jute in Bengal is to be eleven-sixteenths of the area planted in 1934.

CHAPTER XXV

A COALFIELD

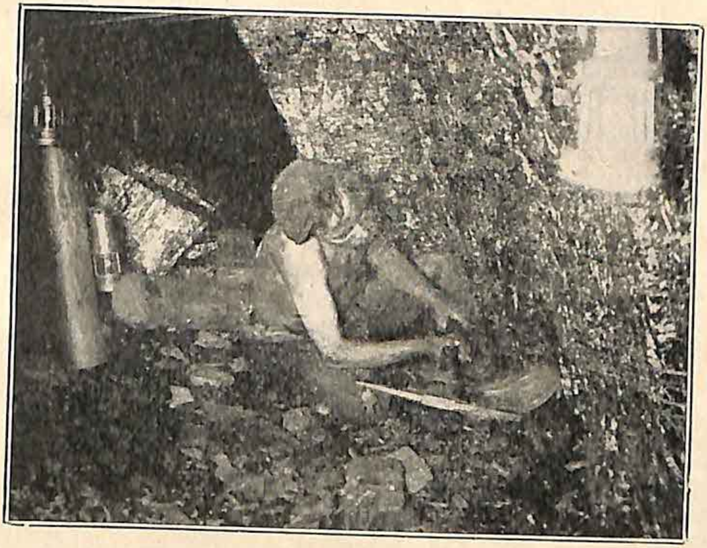
Coal is a kind of fuel obtained by digging the earth. Geologists tell us that in ages long gone by there were vast forests near sea-levels. In course of time the land covered with these forests sank below the sea-level and sediments of mud and sand formed over it. In subsequent times, this land became raised again above sea-level and new forests grew, which in their turn would again slowly sink under the sea. These successive layers of forests became changed by the pressure from above and the heat of the earth into seams (beds) of coal. The deeper the seam, the greater the pressure and heat to which it has been subjected and the harder the coal. The best coal in the world is known as anthracite; it burns without smoke or flame and gives great heat. It is found in South Wales.

KIND OF FOREST FROM WHICH COAL HAS BEEN FORMED

Coalfields are those areas where the coal-bearing layers are near the surface. The largest coalfields are those of America which supply one-third of the world's coal. Great Britain is the third coal-producing country in the world, the second being Germany. The commercial prosperity of Britain is mainly due to her coalfields. India occupies the tenth position among the coal-producing countries of the world. The most important Indian coalfields are at **Jharia** and **Giridih** in Chota Nagpur, and **Raniganj** in Bengal. Smaller coalfields are at Singareni in Hyderabad and in the Central Provinces.

Method of Coal Extraction. In the coalfields men make deep round pits in the ground, and line these with brick or stone. These pits are called shafts, and are about 15 ft. wide. Down these shafts men go to great depths to get the coal. There are mines in which coal is obtained from a depth of 4,000 ft. The coal miners go down the shafts in cages which are let down and drawn up by powerful engines. The coal also is brought up to the surface through these shafts. Each coal mine has two shafts so that if one is closed by an accident, the other one may still be used.

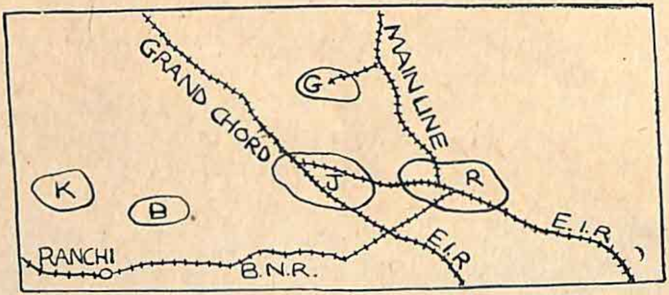
Coal mining is not without its dangers. Sometimes the roofs within the mine fall down, killing the miners. In some mines, a gas forms which explodes if any kind of fire is brought into the mine. Such mines are either lighted by electricity or the miners have to use special safety lamps. Occasionally the mines are flooded by water from underground streams.



A COAL MINER AT WORK

The miner is here seen hewing at a wall of coal. Notice the 'safety lamps' which are specially made so that the flame shall not come into contact with the various gases in the pit and cause an explosion.

The usefulness of coal in the modern world is very great. In cold countries people use it in their homes for heating their rooms; we use it for cooking our food. Coal gas is obtained from coal, and electricity is generated by machines which are run by burning coal. Railway engines and steamships use large quantities of coal



THE COALFIELDS OF BIHAR AND BENGAL
K—Karanpura; B—Bokaro; G—Giridih; J—Jharia; and R—Raniganj.

every day whilst all our mills and factories would stop working if they could not get any coal. The three great industrial countries of the world—America, Germany and England—are all rich in coal.

MINEHEAD OF A COALPIT
The buildings are all made of concrete.

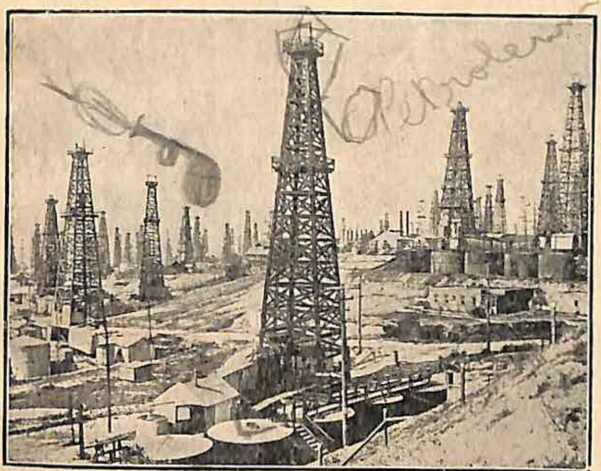
QUESTIONS

1. Can you suggest a reason why the deepest coal mines are never so deep as the deepest gold mines? (Cost.)
2. Make a list of the things you would have to do without had there been no coal in the world.
3. Explain in geographical language: 'Every valley shall be exalted and every mountain and hill shall be laid low.' *Bible,* Isaiah xl. 4.
4. Why is there a great density of population on or near coalfields?

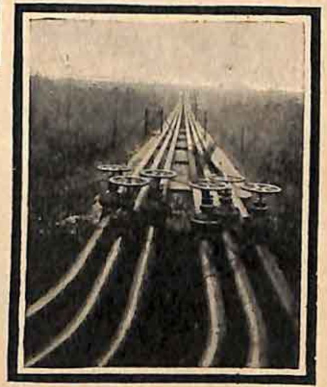
CHAPTER XXVI

AN OILFIELD

Petroleum (*matti ka tel*) is a natural oil obtained by digging the ground in certain parts of the earth. It is used in lamps and for heating purposes, as in stoves. It is difficult to explain the formation of petroleum in the rocks. On sinking a well in an area where there is oil underground, sometimes it spurts up of itself to the surface like a fountain; in other places, it has to be pumped up, just as water is pumped out of a deep well. The oil is then sent by long pipes (some of which are hundreds of miles long) to the place where it is refined. From the crude oil we get **Kerosene,** which we use in our lamps; **Petrol,** which is used in motor-cars, modern ships and aeroplanes; lubricating oils like Mobiloil which are used in machinery; **Vaseline,** and a white solid called **Paraffin Wax** from which candles are made.



DERRICKS AND STORAGE TANKS ON AN OILFIELD IN THE UNITED STATES

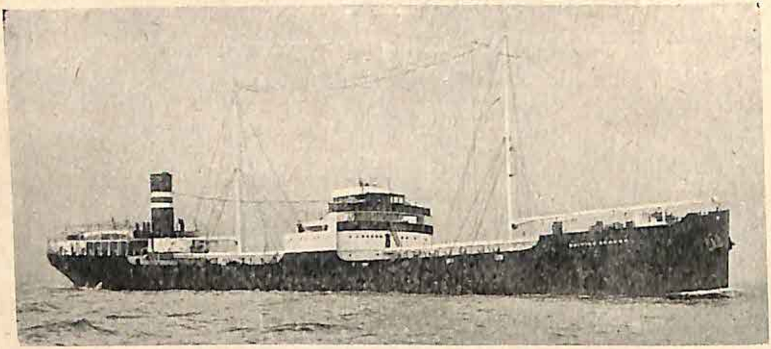


PIPES FOR CARRYING OIL TO THE REFINERY

These pipes are used when it is necessary to carry the crude oil a long way to the refinery. Notice the valves used for controlling or stopping the flow of oil.

The United States of America produces the largest amount of Petroleum in the world.

There are oil wells at **Yenang Yaung** in the dry region of Burma, between the Arakan and Pegu Yomas from which most of our supplies are derived. The oil is sent from here to Rangoon by pipes for refining, and then sent across the sea in special ships (oil tankers).



AN OIL TANKER

This boat can carry nearly 10,000 tons of oil. The oil is stored in the fore part of the ship well away from the engines which are always built at the other end of the boat. (Why ?)

Why

QUESTIONS

1. What are meant by 'B.O.C.' and 'Socony' ?
2. What is Vaseline used for ?
3. Try to imagine what the world would be like if there were no petroleum.
4. Why is petroleum sent by pipes over long distances to refineries instead of being refined at the spot where there are oil wells ?
5. Compare coal and oil as fuels for running machinery.

   (A small amount of oil can do the same work as a large amount of coal. Being a liquid, oil can be carried from one place to another much more conveniently than coal. In burning, oil does not give out such black smoke as coal, and so is much cleaner to use.)
6. What brand of kerosene oil is used in your home ? Does it come from Burma, or the United States ?

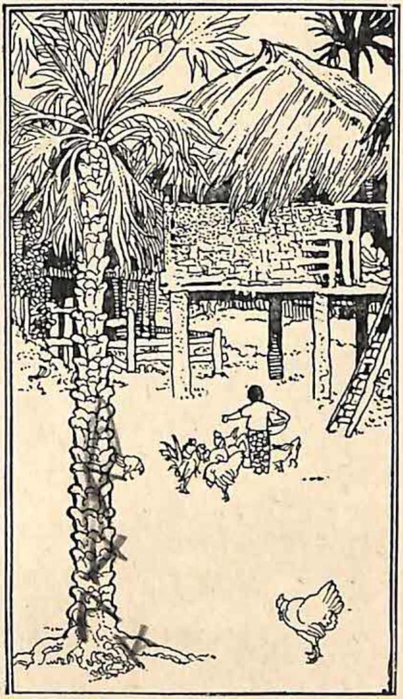
CHAPTER XXVII

BURMA

Position. Burma is the easternmost province of India. Although politically a part of India it is entirely different from the rest of India as regards geographical features, race, language, religion and culture.

Boundaries. Burma is bounded on the north by China; on the east by China, French Indo-China and Siam; on the south by the Bay of Bengal, and on the west by Assam, Bengal and the Bay of Bengal.

Relief. The eastern part of Burma consists of a plateau between 3,000 and 4,000 ft. high. This is called the **Shan Plateau**: it has been cut through by rivers. The central part of the country consists of parallel ranges of mountains separated by river valleys which widen out into delta plains near their mouths. The western part of the country is a hilly region separating Burma from the rest of India. It is narrow in the north, gets broader in the middle and becomes narrow again in the south. This hilly region is difficult to cross, hence there is no railway communication between India and Burma. There is a bi-weekly air service between Calcutta and Rangoon.

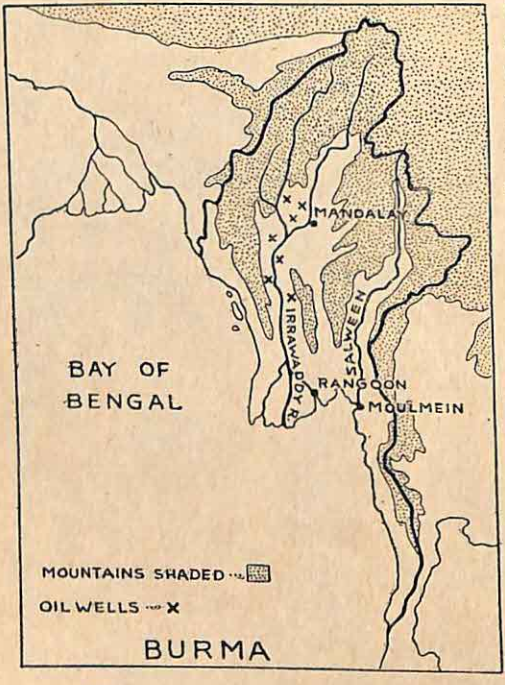


A SCENE IN BURMA

Notice the wooden houses with their thatched roofs, built on pillars as a protection against snakes, wild beasts and floods.

Rainfall. The coastal region of Burma, being directly exposed to the South-West Monsoon, has a very heavy rainfall (80-200 in.). Compare this with the Western Coastal Plain of the Indian Peninsula. Central Burma is the driest part of the country, being in the rain-shadow region of the Arakan and Pegu Yomas. The rainfall here is below 40 in. (What is the rainfall of the Deccan in the rain-shadow region of the Western Ghats ?) The Shan Plateau has a rainfall of 60-80 in.

Drainage. Excepting the central dry region, the whole of Burma receives good rain. The country is drained by the rivers: **Irrawaddy** with its tributary the Chindwin, the **Sittang,** and the **Salween.** The Valley of the Irrawaddy lies between the Arakan Yoma and the Pegu Yoma. The Sittang Valley lies between the Pegu Yoma and the Shan Plateau. The Salween cuts through the Shan Plateau. The Irrawaddy is the great highway of Burma. There is a regular steamer service on the Irrawaddy from Rangoon to Bhamo, a distance of 900 miles. As the Irrawaddy Valley is the most densely populated part of the country, there is heavy traffic up and down the river. Logs of teak are floated down the rivers from the forested hill sides to reach Rangoon and Moulmein.



Climate. The climate of the coastal region of Burma is very similar to that of the Western Coastal Plain. There is very heavy rainfall and so the range of temperature is naturally small. The difference between summer and winter is not very marked. In the hot weather, the cool sea breezes make the climate pleasant.

The Dry Zone has a climate similar to that of Bihar; summers are hot, winters are cool.

The Shan Plateau, with an average height of 3,000 ft. and a rainfall of over 80 in., is cooler than Ranchi or Hazaribagh. It is the only place in the Indian Empire cool enough throughout the year for European settlement. The river deltas have a climate similar to that of Lower Bengal.

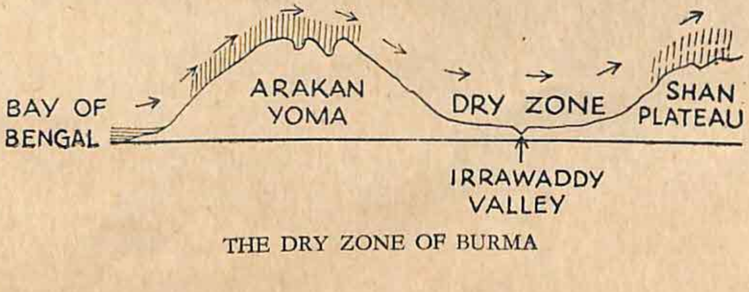
BURMESE LADIES

Chief Products. In the coastal regions, the river valleys and the deltas **Rice** is the chief product. Burma is the only province of India that has surplus rice for export. The elevated Shan Plateau is more suitable for growing grass than for the raising of crops. Sheep, goats, horses and cattle are reared on the grassy plateau.

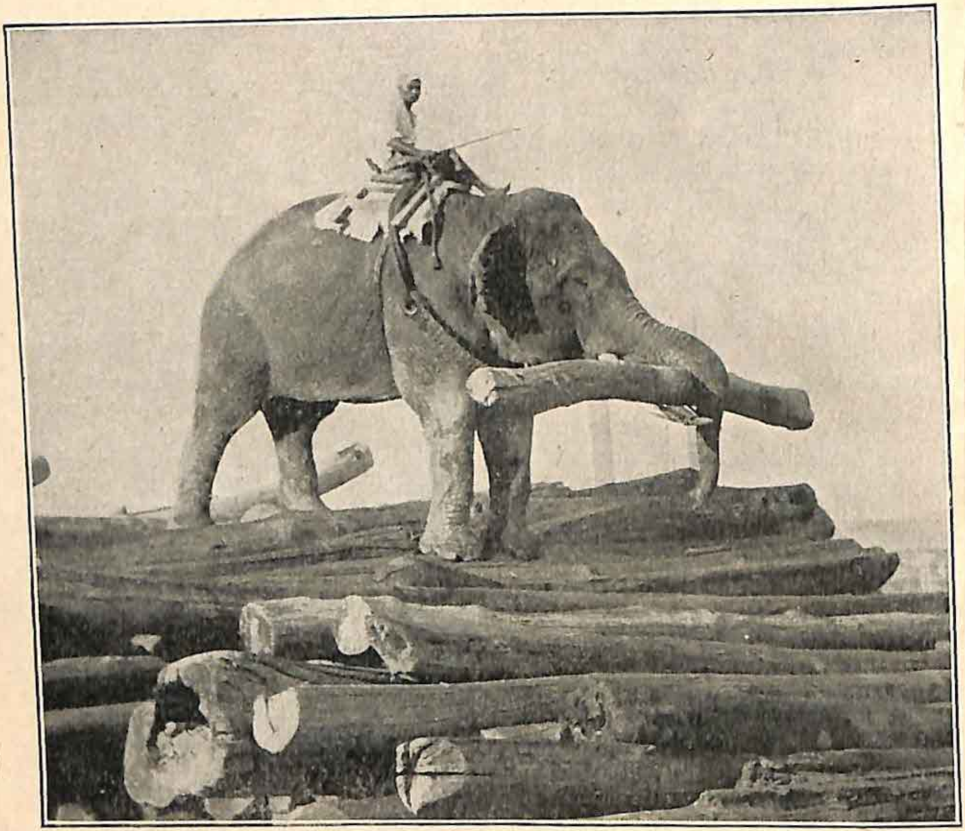
In the Dry Zone rice is grown on irrigated land, but dry crops like millet, sesamum (*til*), ground-nuts, maize, cotton and tobacco are also important.

In the deltas, rice is the chief crop, but tobacco is also grown for the manufacture of the well-known Burma Cigars.

The Pegu Yomas are covered with valuable **Teak** forests. The trees are cut down and the logs dragged into **rivers** by elephants.



THE DRY ZONE OF BURMA



ELEPHANTS PILING TEAK

The teak logs float down-stream to the saw mills at Rangoon and Moulmein. Teak is the third most important export of Burma.

Minerals. Like the plateau of Chota Nagpur, the Shan Plateau is very rich in minerals. There are mines of **Silver, Lead** and **Zinc** at **Bawdwin.** The famous **Ruby** mines of Burma are at **Mogok.**[1] In the dry zone is found the most important mineral product of Burma, **Petroleum.** There are oil wells at **Yenang Yaung, Yenangyat, Singu** and **Minbu** worked by the Burma Oil Company (B.O.C.). Much of the kerosene oil used by us comes from these

---

[1] The ruby mines are not working now because there is very little demand for rubies at present.

A FESTIVE SCENE IN BURMA

oilfields. The oil is sent through pipes for over 300 miles to Rangoon, where it is refined. Next to rice, petroleum is the most important export of Burma.

Density of Population. Compared with the other provinces of India, Burma is very thinly populated. The density of population of Burma is only 62 per square mile, while Bengal and North Bihar have each a density of population of 646. This explains why Burma has a large surplus of rice for export although there are some Indian provinces such as Bengal, Bihar and Orissa in which much more rice is grown.

Important Towns. Rangoon, the capital of Burma, is the fourth port of the Indian Empire. Like Calcutta, it is situated near the mouth of a river. The famous Shwe Dagon Pagoda of Rangoon is 320 ft. high. Rice mills, petroleum refineries and saw mills lend an industrial atmosphere to the city. Rice, petroleum and teak are the principal exports.

Mandalay, on the Irrawaddy, was the former capital. It is in the centre of the Dry Zone.

CHAPTER XXVIII

EUROPE

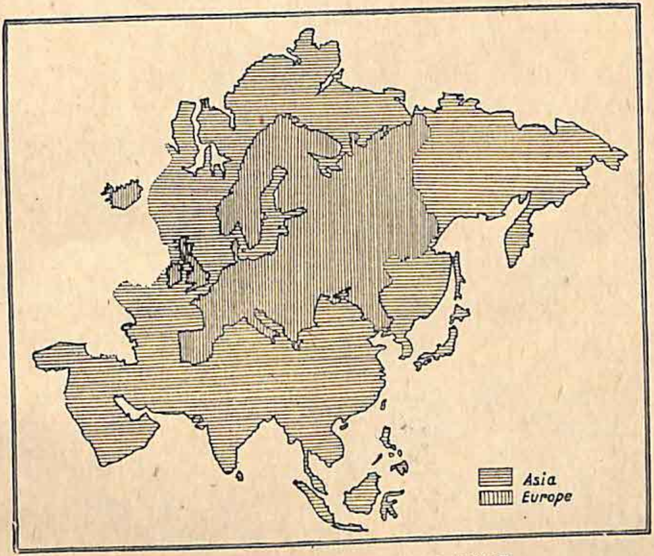
As you can see from the map, Europe is really a peninsula of the Continent of Asia. It is the smallest, but at the same time the most civilized and most densely populated of all the continents. In area it is two and one-fourth times as large as India, but has a population one and one-fourth times as large as that of our country.

Physical Features. Broadly speaking, Europe has two highland regions separated by a plain.

1. The **Northern Highlands** consist of very old, hard rocks and include (1) Scandinavia, (2) Iceland, (3) The Highlands of Scotland, and (4) North Ireland.

2. The **Great European Plain** is really a western continuation of the great northern plain of Asia. The whole of its surface is not quite a level plain like the Ganges Valley but is divided by highlands and ranges of low hills. One part of it has sunk below the sea forming the North Sea and separating the British Isles from the rest of the continent. (How does the map tell you of this ?)

3. The **Southern Highlands** consist of (1) young fold mountains, formed by folding or crumpling of the earth's crust, crossing the continent from east to west, and (2) plateaux.



EUROPE AND ASIA COMPARED

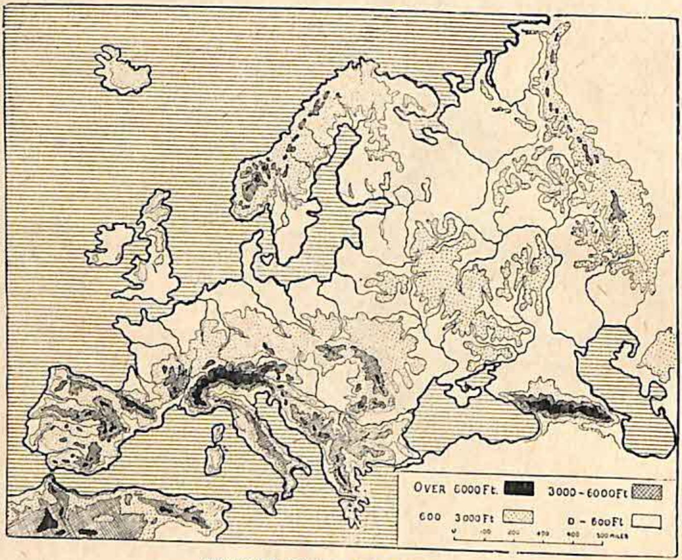
The main chain of the fold mountains may be traced from the **Cantabrian** Mountains in Northern Spain, through the **Pyrenees** and the **Alps,** the **Carpathians** and the **Balkans** to the **Caucasus** Mountains. There are breaks in the chain caused by (1) the Rhone and the Gulf of Lyons, (2) the Danube (twice), and (3) the Black Sea.

From the central mountain knot of the Alps start two low chains in a south-easterly direction ; one, the Apennines, forms the backbone of Italy ; the other runs through the western part of the

Balkan Peninsula and is called the Dinaric Mountains in the north and the Pindus Mountains in the south.

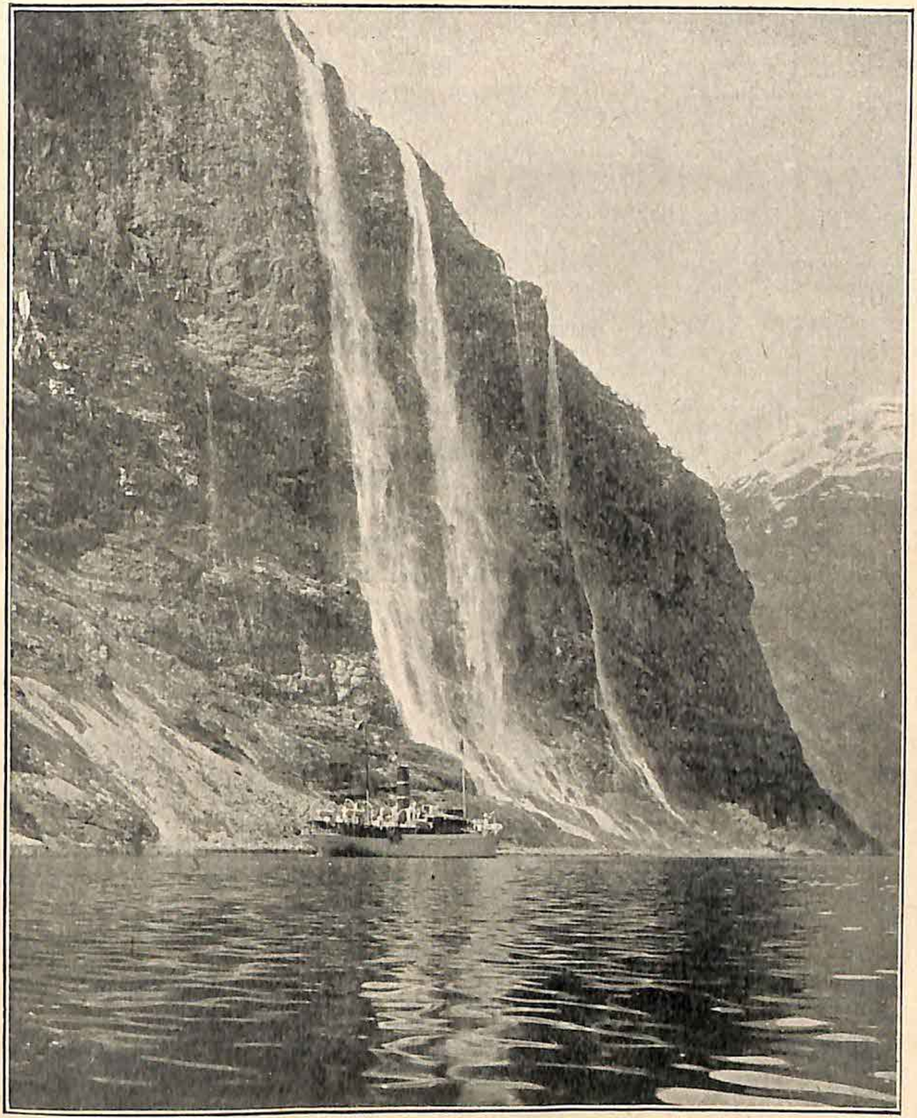
Enclosed within the curves of the fold mountain chains are the three alluvial plains of Lombardy (North Italy), Hungary, and Roumania.

Note also the three worn-down plateaux of old, hard rocks associated with the fold mountains: (*a*) the Spanish Plateau or **Meseta,** (*b*) the Central Plateau of France, and (3) the Bohemian Plateau.



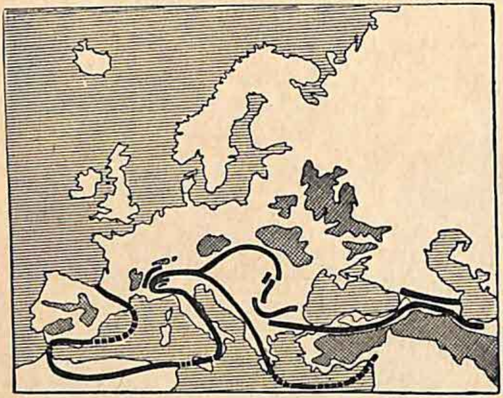
STRUCTURE OF EUROPE

Coastline. The mountain ranges in Europe approach the sea from the land and are not parallel to the coast. This makes communication easy between the coast and the interior. The presence of many gulfs, bays, seas, estuaries, and peninsulas makes the coastline of Europe, in proportion to its size, longer than that of any other continent. (Compare the coastlines of Europe and India. How do the mountain chains run in relation to the coast of India?)



MOUNTAINS OF NORWAY

Rivers. The rivers flowing into the Arctic Ocean are icebound for nine months in the year, and hence are of very little importance. (Can you name three such Asiatic rivers ?)



MOUNTAINS OF SOUTH EUROPE

Flowing into the Baltic Sea are the **Vistula,** the river of Poland, and the **Oder,** the river of East Prussia. The mouths of these rivers are frozen for three months in the year.

Flowing into the North Sea are: the **Elbe,** the river of Central Germany; (2) the **Rhine,** the national river of the Germans, and (3) the **Thames,** the river of London.

Flowing into the English Channel is the **Seine,** the river of Paris.

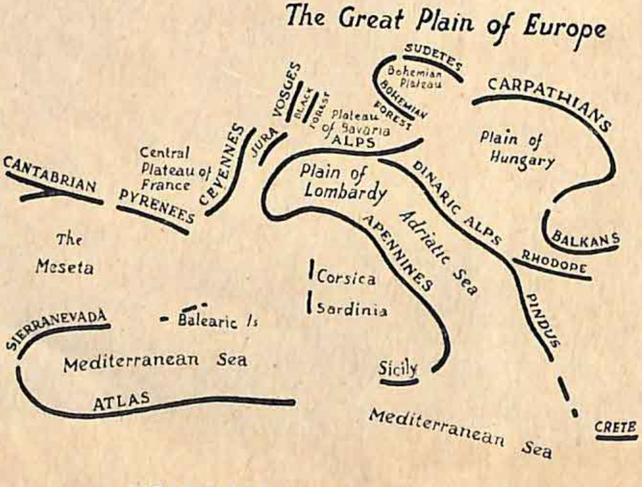
Flowing into the Bay of Biscay are the **Loire,** the river of Central France, and the **Garonne,** the river of Southern France.

Flowing into the Atlantic Ocean are the **Douro** and the **Tagus,** the rivers of the Iberian Peninsula.

Flowing into the Mediterranean Sea is the **Rhone,** the river of Eastern France.

Flowing into the Adriatic Sea is the **Po,** the river of Lombardy.

Flowing into the Black Sea is the



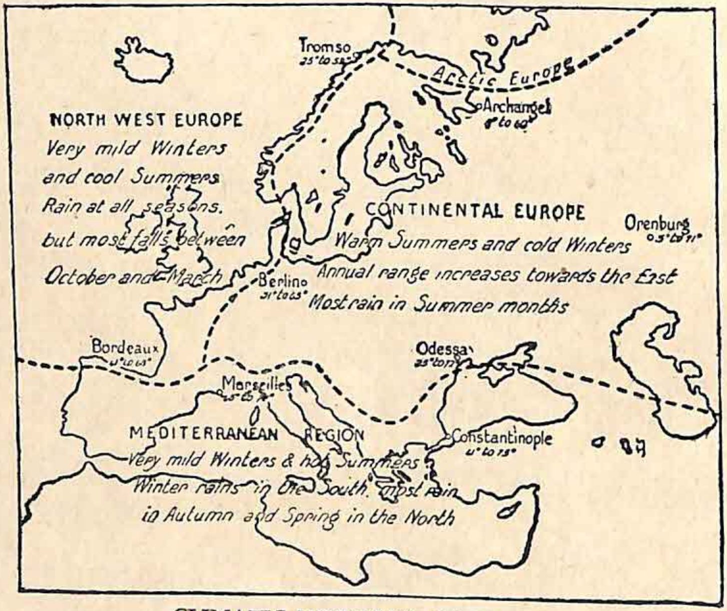
MOUNTAIN SYSTEMS OF EUROPE

CLIMBING IN THE ALPS

Danube which flows through seven countries. (Name them from the map.)

The largest European river, the **Volga,** flows into the Caspian Sea.

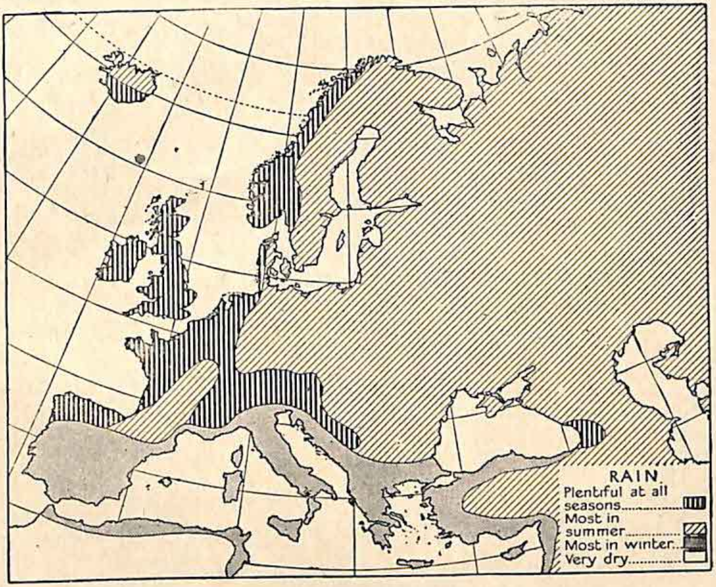
Lakes. Many thousands of years ago, the whole of Central and Northern Europe was entirely covered by a great sheet of ice from which vast rivers of ice moved across the country along natural slopes. These rivers of ice made hollows on the surface of the land over which they flowed, and when the ice melted, these hollows became lakes. The big Russian lakes, **Ladoga, Onega,** and a vast number of others in Finland and Sweden are believed to have been formed in this way.



CLIMATIC DIVISIONS OF EUROPE

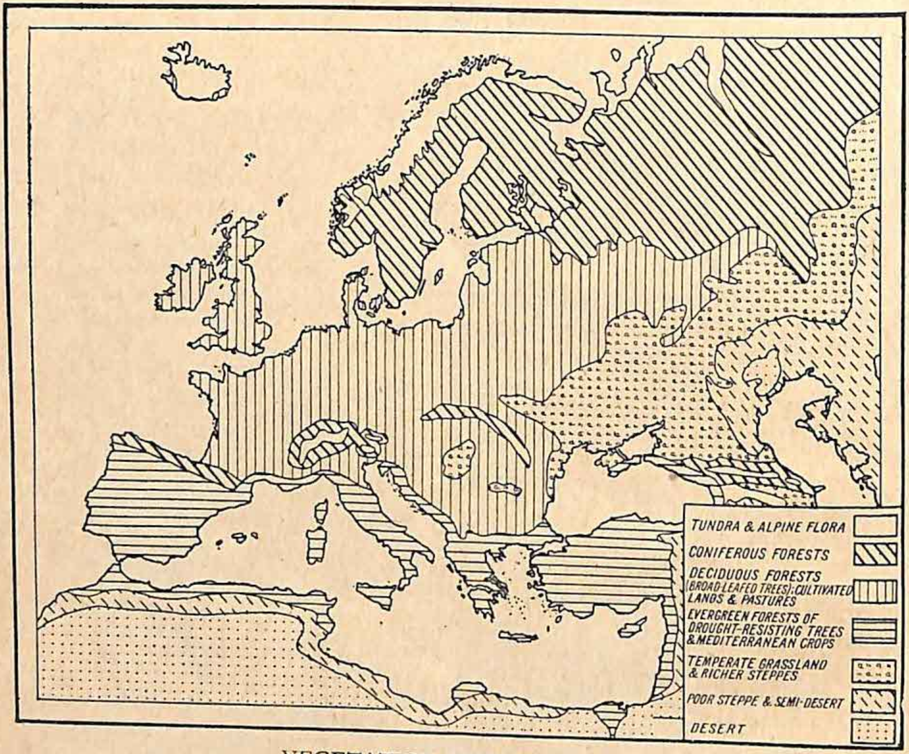
Climate. Practically the whole of Europe lies in the cool temperate zone, between the Arctic Circle and 40° N. Lat., the finest climatic belt in the world. There are four main climatic regions in Europe :—

1. On a blank map of Europe, draw a line from Oslo to Marseilles. The part of Europe west of this line is subject to westerly winds and cyclones coming over the Atlantic Ocean. In this **Region of the Westerlies** rain falls throughout the year, the winters are not very cold, the summers are cool, that is to say, like our winters. The difference of temperature between summer and winter is not great (about 20°). The rivers do not freeze in winter, nor does snow lie permanently on the ground.



RAINFALL MAP OF EUROPE

2. East of the Oslo-Marseilles line, **Continental** or Eastern Europe gets much less rain than Western Europe. Being far removed from the sea, the westerly winds lose much of their moisture by the time they reach Central Europe. Being the interior of a continent and beyond the influence of the ocean winds, the range of temperature is great; the summers are warm and the winters cold. Rain falls mainly in summer, and winter is a comparatively dry time. The rivers are frozen in winter and snow lies on the ground without melting for at least a month.


TUNDRA & ALPINE FLORA
CONIFEROUS FORESTS
DECIDUOUS FORESTS (BROAD LEAFED TREES); CULTIVATED LANDS & PASTURES
EVERGREEN FORESTS OF DROUGHT-RESISTING TREES & MEDITERRANEAN CROPS
TEMPERATE GRASSLAND & RICHER STEPPES
POOR STEPPE & SEMI-DESERT
DESERT

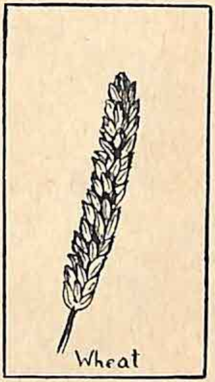
VEGETATION MAP OF EUROPE

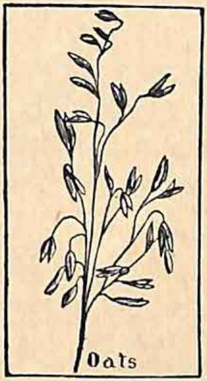
3. Northern Europe, within the Arctic Circle, has the **Arctic** type of climate: the winters are long and very cold, the summers are short and warm.

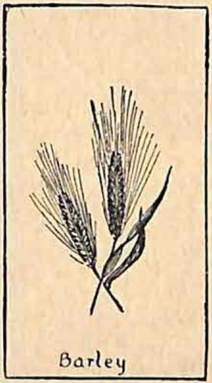
4. Southern Europe comes under the influence of the rain-bearing westerly winds from the Atlantic in winter, and has the **Mediterranean** or **Winter Rain** type of climate. Roughly speaking, the Mediterranean region in Europe may be supposed to lie between the latitudes of 32° and 42°. The summers here are hot (like our springs or autumns) and dry, the winters are mild (as cold as winters in the Punjab) and rainy. Like India, the southern peninsulas of Europe are protected by the central mountain chains from the cold winds of the north.

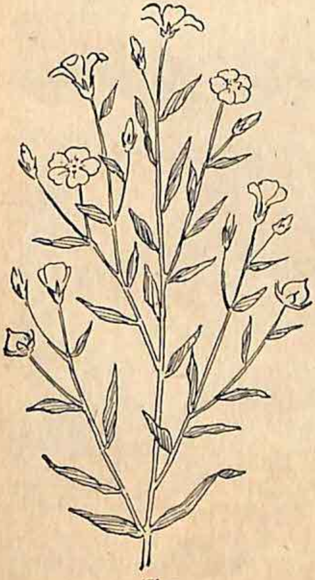
Note that because of its small size, no part of Europe is far from the sea. The mountains are not parallel to the coast and there are numerous gulfs, bays, and inland seas. All these allow the influence of the ocean (rain, warmth) to penetrate far inland.

Vegetation. In the extreme north, bordering the Arctic Ocean, are the treeless **Tundras** where only mosses, lichens, and small berry-bearing bushes grow. South of this is the **Taiga** or the belt of cone-bearing forest of pines (*chir*), firs, and larches extending over the whole of the northern part of Eurasia. These are evergreen trees with needle-shaped leaves. Instead of bearing flowers and fruits, they have *cones* in which their seeds grow. (*Chilguza* is the seed of the pine.) The southern limit of the **Taiga** is roughly the parallel of latitude passing through Leningrad.









Flax

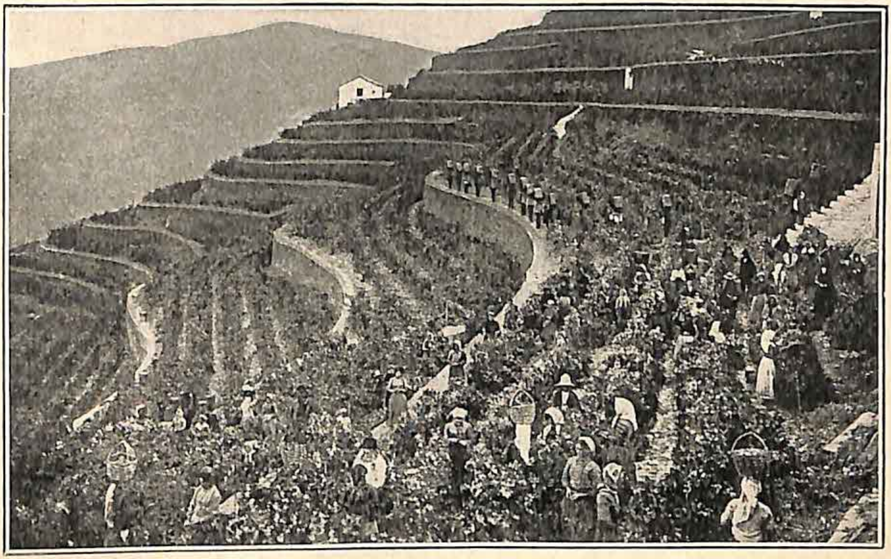
From the southern margin of the Taiga and extending up to the central highlands is the **Deciduous** (leaf-falling) **Broad-leaved Forest** belt of oak, beech, birch, elm, maple and ash. The trees here cannot get water from the soil during the cold winter months, and to prevent loss of moisture through the leaves, they shed their leaves and remain bare for about five months in the year. In our country also there are many deciduous trees (*neem*, *bel*, *pipal*) which shed their leaves when they cannot get any moisture from the soil during the dry summer months. Trees that shed their leaves all at one time and remain bare for some part of the year are called deciduous trees.

Except on the mountains, most of the forests in this region have now been cut down for agriculture. The chief crops of this region are those that are usually grown in cool temperate regions, namely food-grains like wheat, oats, barley, rye; root crops like potatoes and sugar-beet; fibre-yielding plants like flax and hemp; fruits like apples, pears, plums; pulses (*dal*) like peas and beans.

East of this belt of deciduous forests, the rainfall is so small as to prevent the growing of trees. This temperate grassland is really the western part of the **Steppes** which occupy the interior of Eurasia. As

GATHERING LEMONS IN ITALY

As the fruit is nearer to the camera than the men, it looks bigger than it really is. It is about the size of a small apple.



GATHERING GRAPES IN PORTUGAL

Every inch of available land is given over to the cultivation of grapes. The vines are planted on a series of ascending terraces.

in other temperate grasslands of the world, wheat is the most important crop here. The **Black Earth** of this region, containing a large amount of rotting vegetation, is also very good for growing wheat.

In the **Mediterranean Region** the trees have special ways of preventing loss of moisture from the leaves during the dry summer.[1] The chief plants of this region are olive, cork oak (from the bark of which cork is obtained), myrtle, cypress, cedar (from the wood of which pencils are made), and oleander (*karabi*). The Mediterranean region is famous for its fruits: grape, from which raisin (*manacca*), sultana (*kismis*), currant, and wine are made; orange, lemon, fig (*anjeer*), peach (*aru*), apricot (*khobani*), pomegranate (*anar*). The mulberry tree (*sub-toot*) thrives in this region and silkworms are reared on its leaves. Various nuts like almond (*badam*), walnut (*akhrot*), and pistachio (*pista*) nuts are grown. Among vegetables, onions and tomatoes, lavender and mint (*pudina*) are natives of this region. The chief food crop of this region is wheat, but rice can also be cultivated with the help of irrigation. (Remember that the summers here are dry.) Lentils (*masoor*) and gram (*chana*), peas and beans are among the pulses of this region. (Can you say why manufacture of wine and the silk industry are found in all countries in this region? How many of the fruits mentioned above can be seen in the average *mewawallah's* shop in winter?)

---

[1] For example, onion (fleshy bulb); lemon and orange (leathery leaf); lavender or *pudina* (aromatic oil in leaf); olive (leaf with fine hair); grape (very long root).

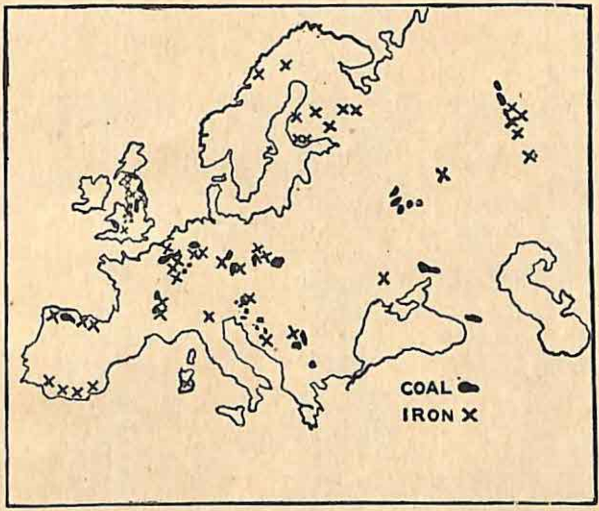
ORANGES GROWING
(Notice the special cutter.)

Why is Europe the most civilized of all the Continents? The geographical reasons for the present[1] great advancement of

---

[1] Civilization developed earlier in Asia and Africa (Egypt) than in Europe.

Europe are: (1) Most of the continent lies in the cool temperate zone where the climate is neither too hot nor too cold for man to work hard throughout the year. (2) Rainfall is not uncertain in the westerly belt as in the monsoon countries. (3) Inland seas, and the positions of the mountains permit the influence of the sea to be carried far inland. (4) The Gulf Stream (North Atlantic Drift) has a warming influence on the climate. (5) The long broken coastline abounds in good harbours. The shore-dwelling peoples were encouraged by the shallow seas dotted with islands to become fishermen, and their experience of the sea made them bold sailors, navigators, and traders. (6) Long navigable rivers afford easy communication between the coast and the interior. (7) Deposits of coal and iron are to be found not far from one another in many places. This has encouraged industrial development and has given Europe an enormous advantage in this 'steel age'. The most developed countries of Europe are those that have deposits of both coal and iron, viz. England, France and Germany.



COAL AND IRON REGIONS OF EUROPE

Countries of Europe. The principal political divisions of Europe are given below :—

COUNTRY	FORM OF GOVERNMENT	CAPITAL
Norway	Kingdom	Oslo
Sweden	Kingdom	Stockholm
Denmark	Kingdom	Copenhagen
Finland	Republic	Helsingfors
Esthonia	Republic	Tallinn (Revel)
Latvia	Republic	Riga
Lithuania	Republic	Kovno
U.S.S.R.(Russia)	Soviet Republic[1]	Moscow
Poland	Republic	Warsaw
Germany	Republic	Berlin
Holland	Kingdom	The Hague
Belgium	Kingdom	Brussels
Great Britain and Northern Ireland	Kingdom	London
Irish Free State	Republic	Dublin
France	Republic	Paris
Spain	Republic	Madrid
Portugal	Republic	Lisbon
Switzerland	Republic	Berne
Italy	Kingdom	Rome
Austria	Republic	Vienna
Czechoslovakia	Republic	Prague
Hungary	Kingdom	Budapest
Jugo-Slavia	Kingdom	Belgrade
Roumania	Kingdom	Bucharest
Bulgaria	Kingdom	Sofia
Albania	Kingdom	Scutari
Turkey in Europe	Republic	Ankara
Greece	Republic	Athens

---

[1] *Soviet* is a Russian word meaning a committee. A soviet republic is one that is ruled by committees or soviets of the representatives of different classes of people. U.S.S.R. is the shortened form of the full name 'Union of Soviet Socialist Republics'.

QUESTIONS

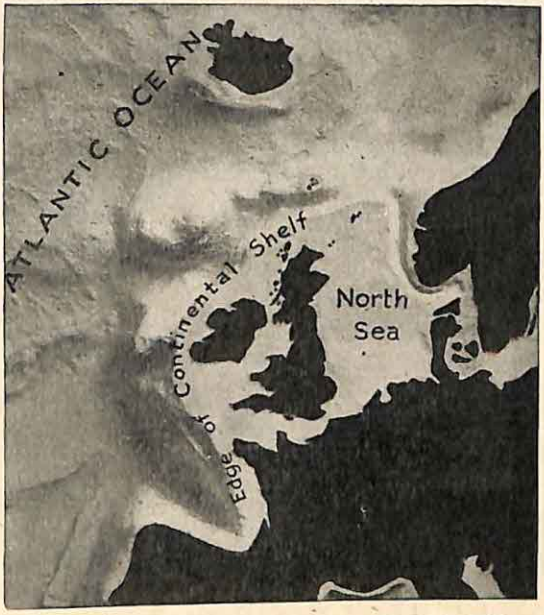
1. Look at the map of Europe and say why it is called a 'continent of peninsulas'.

2. Which portion of Europe has (*a*) rain all the year round, (*b*) rain in winter only, (*c*) rain mainly in summer?
3. The kingdoms of Europe are mainly to the north-west and the south-east of the continent. Examine the map to verify the above statement.
4. Where in Europe are (1) the coldest regions in winter, (2) the hottest regions in summer?

CHAPTER XXIX

THE BRITISH ISLES

THE British Isles consist of two large islands, Great Britain and Ireland, and a number of smaller ones. These islands represent the highest portions of the north-western part of the continent of Europe which has sunk beneath the sea. The map in your atlas will show that the British Islands are situated on a continental shelf which is not more than 600 ft. deep. Study of rocks also shows

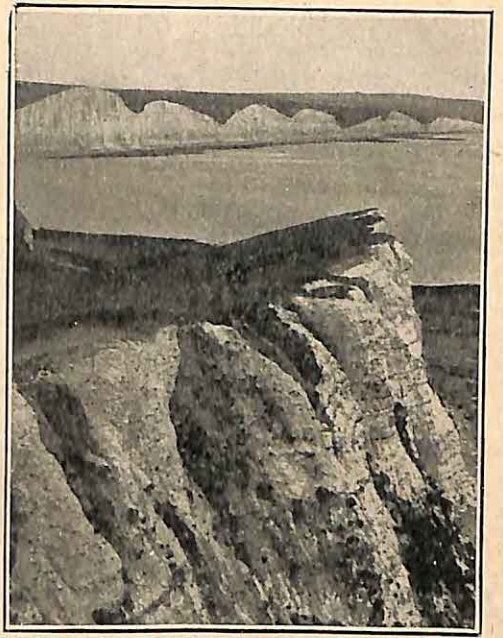


CONTINENTAL SHELF OF N.-W. EUROPE

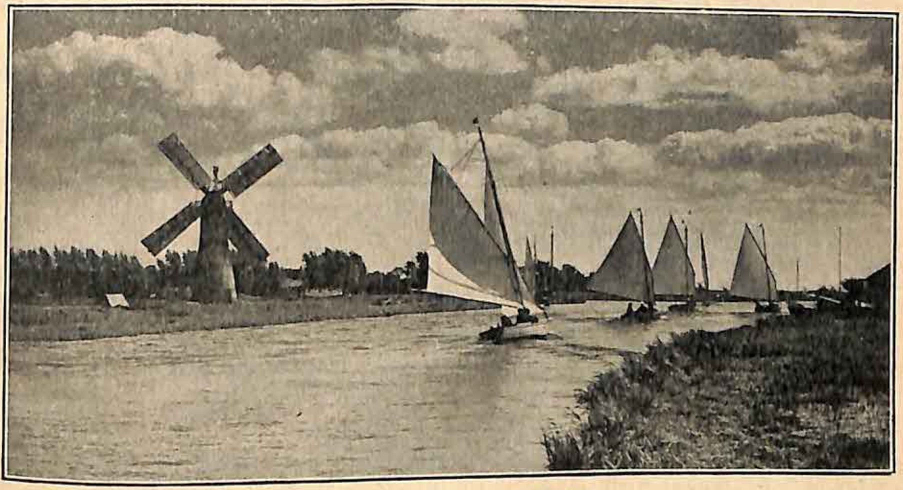
LAND'S END
The granite rocks of Cornwall.

that the British Isles were formerly a part of the European continent. The granite rocks of Cornwall and Devon in south-west England are exactly like the rocks of Brittany on the opposite French coast. The white chalk cliffs of south-east England, which are eagerly looked out for by Englishmen returning home, are very similar to the chalk cliffs of Calais in France. The low eastern counties of England are exactly like the low country of Holland. The Scottish Highlands are made of the same kind of rocks as the mountains of Scandinavia.

Great Britain consists of three countries, **England** in the south, **Scotland** in the north, and **Wales** to the west. Great Britain is a little larger in size than Bengal, England is less than half the size of Bihar and Orissa, Scotland is about half the size of Assam, Wales is smaller in size than Baroda, Ireland is less than one-third the size of the Central Provinces.



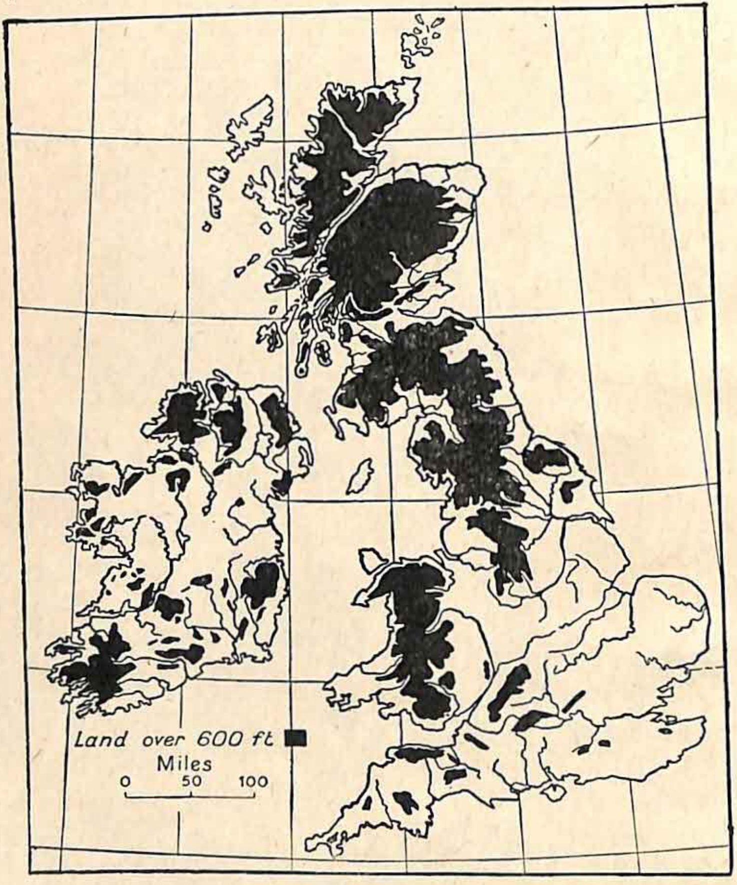
CHALK CLIFFS OF DOVER (SOUTH-EAST ENGLAND)



THE NORFOLK BROADS

These beautiful stretches of water in the flat land of the East of England are a wonderful holiday ground for those interested in boating or fishing, and stretch for many miles. Note the windmill. The scenery is exactly like that of Holland.

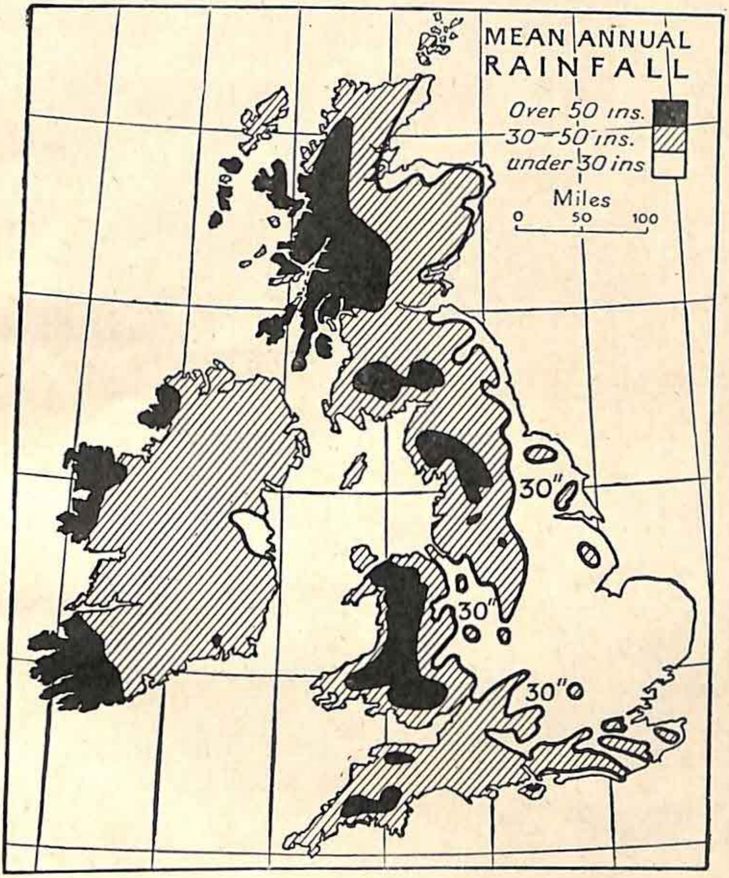
Ireland is divided into **Northern Ireland** and the **Irish Free State** (I.F.S.). Great Britain and Northern Ireland form one kingdom called the **United Kingdom.** Except in name, the Irish Free State is practically a republic.



HILLS AND PLAINS OF THE BRITISH ISLES
(Low lands white, high lands black.)

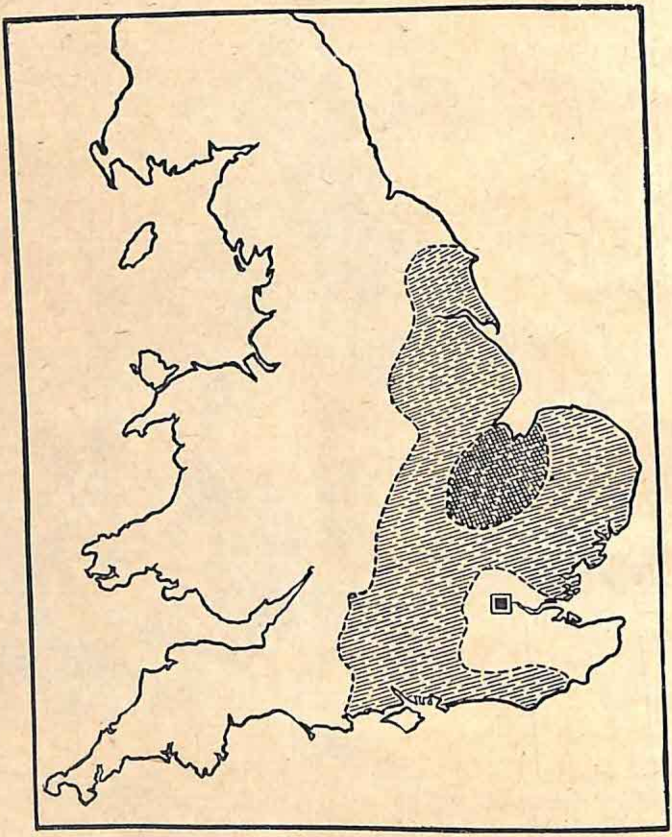
(Between what latitudes do the British Isles lie? In what climatic zone?)

Physical Features. The map will show you that the British Isles have a very broken coastline. (How does it compare with the coastline of India?) As in all broken coasts, there are many excellent harbours all along the shore which have encouraged the people to become expert fishermen. Their life on the sea led them to become explorers of unknown seas and carry on trade with



Compare this illustration with that showing hills and plains (opposite), and notice the general relationship which appears between the high land and high rainfall.

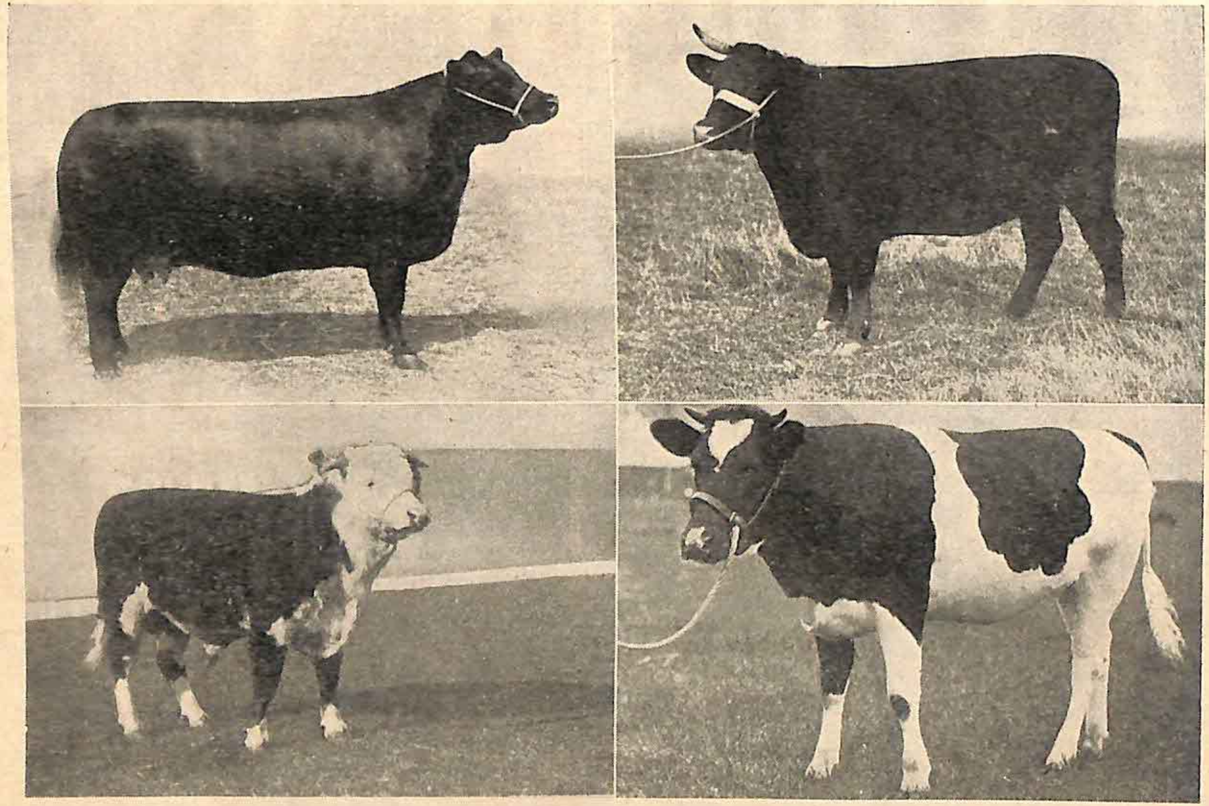
distant lands. The vast trade carried on by England with foreign countries, Britain's command over the seas, and the widespread British Empire have all been natural consequences of this possession of a broken coastline.



WHEAT-LAND IN ENGLAND

The shaded portion shows where most wheat is grown, the darker part being the best of the English wheat-land.

Scotland may be divided into the **Northern Highlands,** the **Southern Uplands,** and the **Midland Valley** between the two. England may be divided by a line joining the mouth of the Humber



TYPES OF BRITISH CATTLE

(1) Aberdeen Angus cow (top left).
(3) Hereford bull.

(2) Shorthorn heifer (top right).
(4) Friesian heifer.

THE WHARF OF A FISHING PORT
Notice the heaps of fish that have just been landed.

with the mouth of the Severn into two parts, of which the western part is mainly hilly and the eastern part is composed mainly of lowlands. As minerals are usually found in hilly districts, the western section is chiefly industrial (**Black England**) and the eastern section is mainly agricultural (**Green England**). The **Pennine Chain** runs down the centre of England as a backbone in the north. The highest mountain in Great Britain, **Ben Nevis,** is as high as our Parasnath Hill. The whole of Wales is a plateau of old, hard rocks, which has been cut through by rivers. It is mainly given to sheep-rearing. Ireland with its mountainous rim and central lowlands may be compared to a saucer. This kind of structure has caused many useless bogs in different parts of the country.

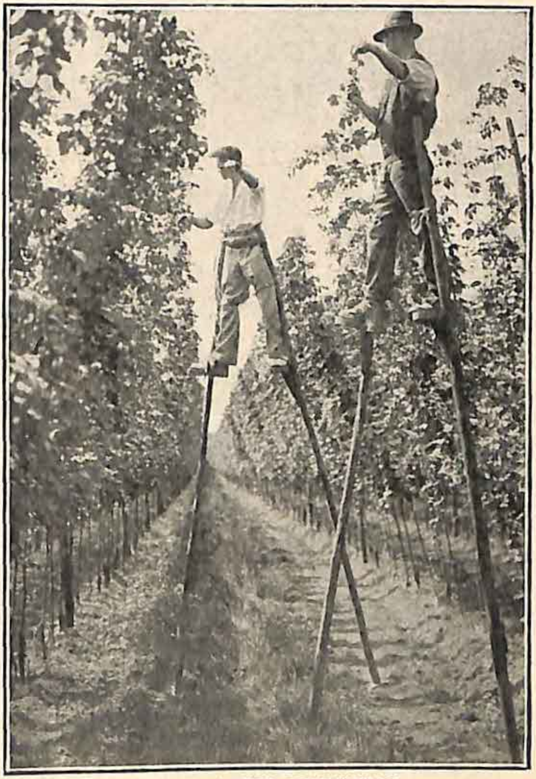
The only importance of the rivers of the British Isles is that great ports have developed at the mouths of their tidal estuaries. Note the positions of the following important ports: Aberdeen (at the mouth of the Dee), Dundee (the Tay), Leith (the Forth), Newcastle (the Tyne), Hull (the Humber), **London** (the **Thames**), Bristol (the Severn), Liverpool (the Mersey), Glasgow (the Clyde). The English rivers are little used for navigation. The waters of the Shannon, the largest river in Ireland, are now used for generating electricity.

Climate. The climate of the British Isles depends on the following factors :—

(1) The surrounding ocean makes the climate mild, that is to say, the range of temperature is small.

(2) The warmth of the North Atlantic Drift is carried inland by the south-westerly winds. This makes the British Isles much warmer than other parts of the world in the same latitude such as Labrador, Kamchatka or Siberia. As the highlands are mainly to the west, the western parts get more rain (40 in.) than the eastern parts (25 in.).

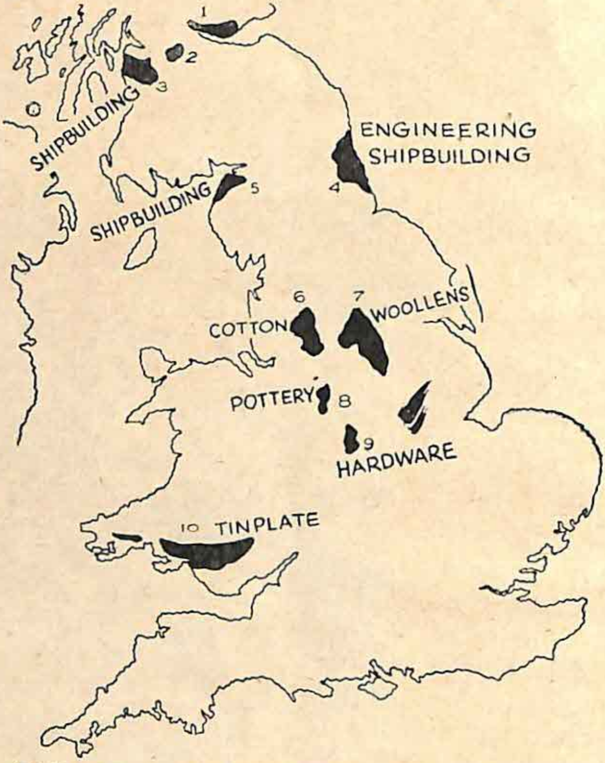
(3) The south-westerly winds and cyclones bring rain throughout the year. There is no 'rainy season' as in India.



HOP PLANTS GROWING

When the plants reach the top of the poles they have to be tied securely. The men are standing on stilts, which have been used for this purpose for many years.

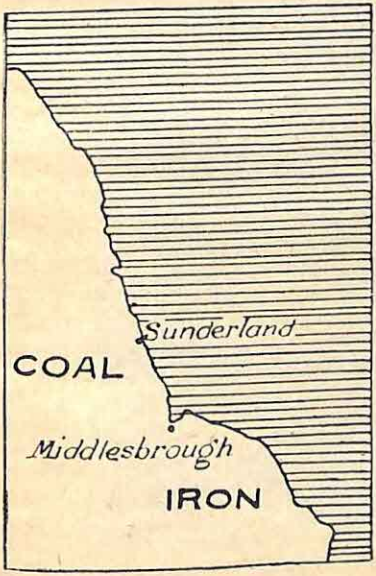
A peculiarity of British weather is its extremely uncertain character. In India, the weather is exactly the same, day after day, for long periods at a time. In England, no one can say in the morning what the day will turn out to be. It may be bright and clear in the morning but may start raining a short time after; a cloudy and gloomy morning may be followed by a fine day. The average temperature of England is nearly the same as that of the hill stations of India.



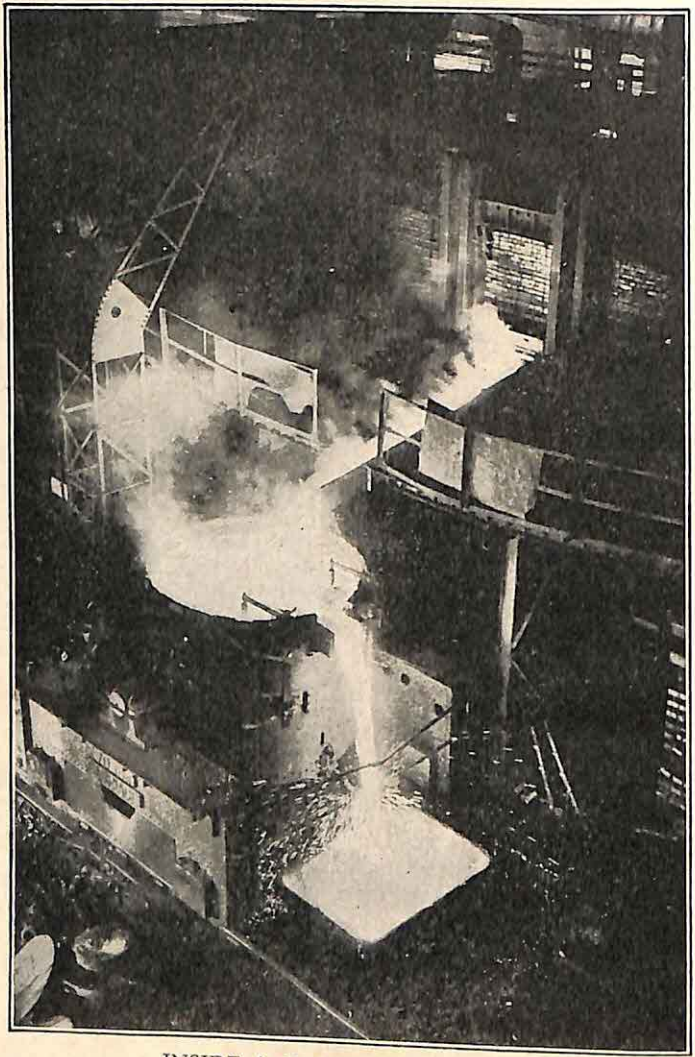
COALFIELDS AND INDUSTRIES OF GREAT BRITAIN

Products and Occupations. The crops are those grown in cool temperate countries. Wheat is grown in the drier eastern parts of England. In the map on page 130, the wheat growing area looks like a hump. Scotland is too cold to grow wheat and so oats and barley are the chief crops there. Hence oatmeal porridge (a kind of *halwa*) is the national breakfast meal in Scotland and whiskey (made from barley) is the national drink of Scotchmen. Ireland and the western parts of England, being directly exposed to the westerly winds from the Atlantic, are much too damp for wheat. Grass is grown with great care in the lowlands and dairy-farming is very important in these parts. The upland areas are given to sheep rearing. Ireland exports large quantities of live stock (cattle, horses, pigs), butter, cheese, hams, bacon and eggs to England. Potatoes thrive in the damp climate of Ireland and form the chief food of the people there. Enormous quantities of fish (mainly herring and mackerel) are caught in the shallow seas surrounding the British Isles. The North Sea is one of the most important fishing grounds of the world. Nearly three and a half crores of maunds of fish are caught annually in the British waters and brought to the fishing ports of Grimsby, Aberdeen, Hull, Yarmouth and Lowestoft for distribution inland.

THE WINDING GEAR OF A COAL MINE



Nearness of coal and iron mines has helped the industrial development of England.

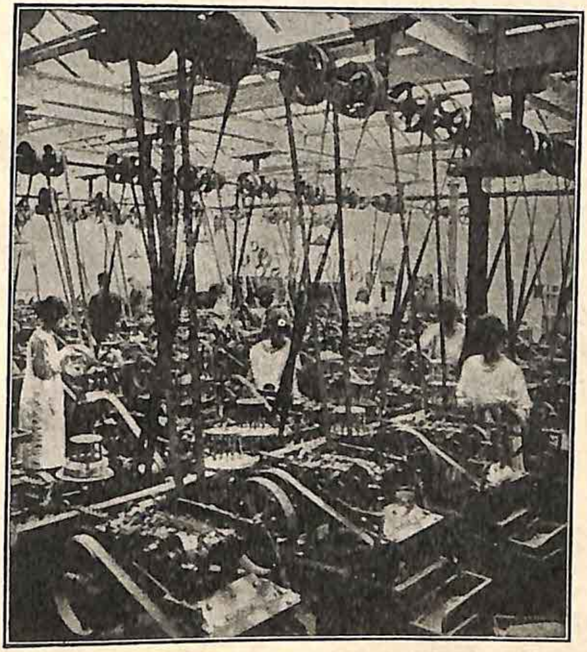


INSIDE A GREAT STEEL WORKS

Here you see the molten metal being run off from the furnace.

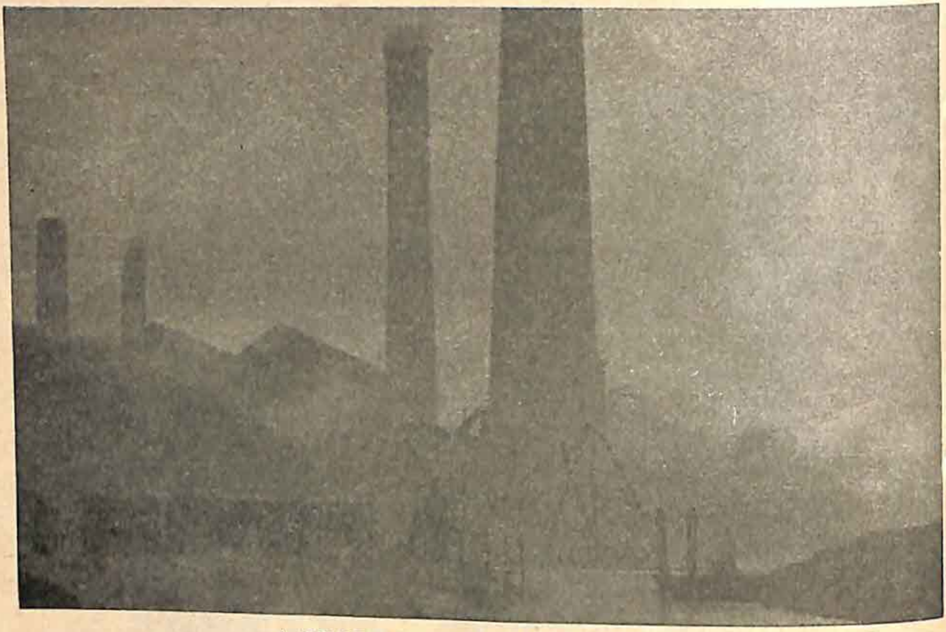
South-eastern England is famous for its orchards. The moderate rainfall, the warm summers and the long hours of sunshine ripen the fruit and this part of the country is bright with apple (*sheo*), cherry, plum (*alubukhara*), gooseberry, raspberry and strawberry. Hops are also grown for flavouring beer.

Minerals and Manufactures. The principal coalfields of Great Britain, starting from the north, are (1) the **Fifeshire** field near Edinburgh, (2) the **Lanarkshire** field near Glasgow, (3) the **Ayrshire** field on the west coast, (4) the **Northumberland** and **Durham** fields, (5) the **Cumberland** field, (6) and (7) the **Lancashire** and **Yorkshire** fields on either side of the Pennine Chain, (8) and (9) the **North** and **South Staffordshire** coalfields, and (10) the



MACHINES IN A PIN FACTORY

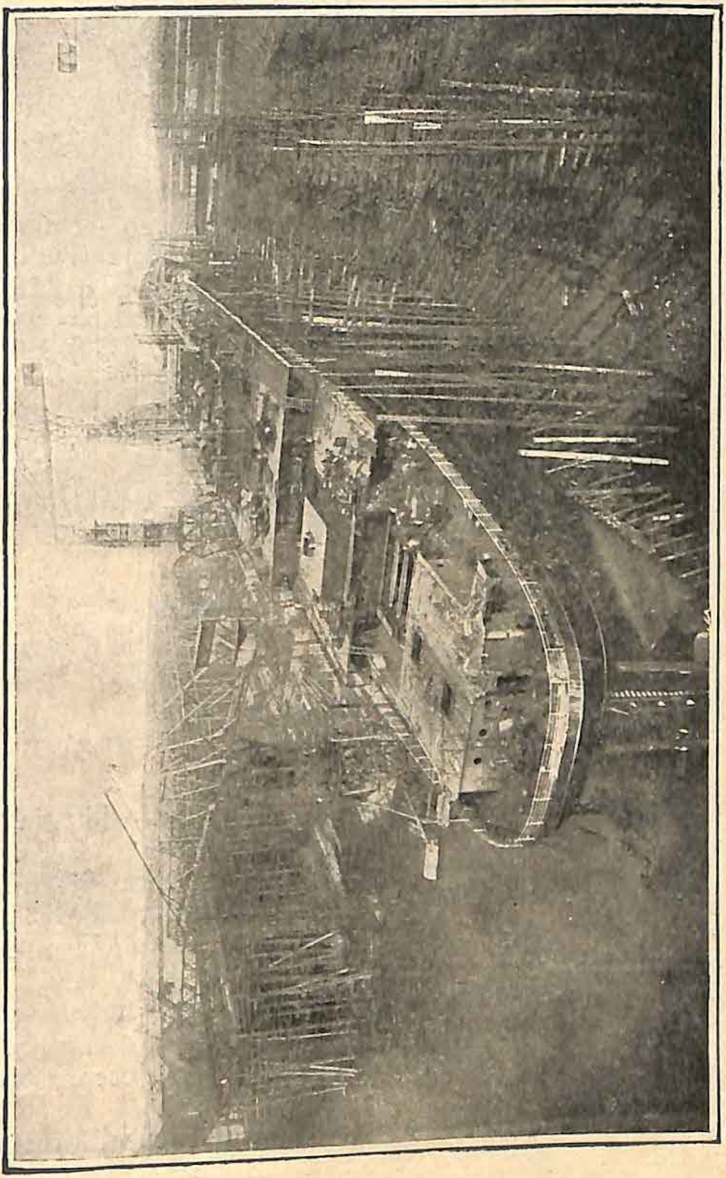
One girl can attend to many machines, and each machine makes thousands of pins a day.



A SCENE IN THE BLACK COUNTRY

coalfields of **South Wales.** Notice (see map on page 134) that all the important coalfields, excepting those of Yorkshire and Staffordshire, are near the sea and coal can easily be shipped for export. England supplies enormous amounts of coal to many countries from the ports of Cardiff and Swansea (South Wales coalfields), Newcastle, South Shields, North Shields, Sunderland and Hartlepool (Northumberland and Durham fields). Some years ago, English coal could be had in Bombay, but now coal from Natal and New South Wales has displaced English coal from the Indian Ocean. The ships that go out from English ports laden with coal bring back various metallic ores and other heavy raw materials like grains and timber on their return journey.

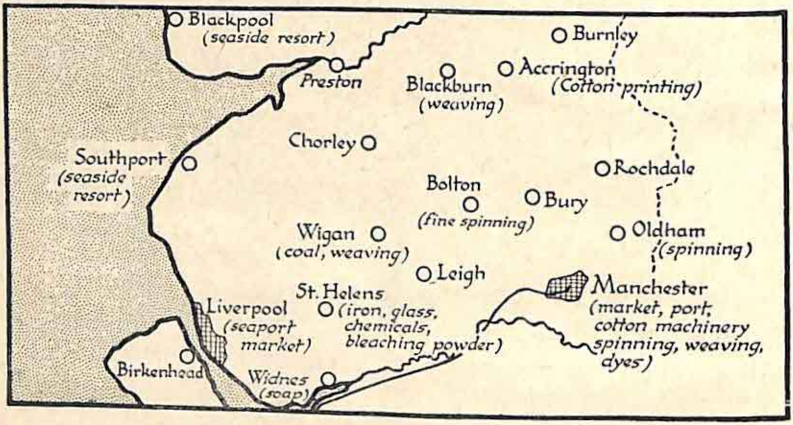
The industrial and commercial greatness of Great Britain is very largely due to her excellent and abundant deposits of coal which are accessible from the sea. The industrial development of the country was due to the iron and coal deposits occurring near one another. Most of the iron ore deposits have now been used up and England has to depend on iron ore brought from Sweden,



SCENE IN A GREAT SHIPBUILDING YARD

Spain, and Algeria. The Irish Free State is not an industrial country largely because of her lack of coal.

The chief **Iron** manufacturing centres of Great Britain are **Birmingham** and **Wolverhampton** on the South Staffordshire coalfield. Because of the black smoke given out by numerous chimneys, this area is known as the **Black Country.** Near this area is **Coventry** which formerly manufactured bicycles, but now also manufactures motor-cars and aeroplanes. The Austin motor-cars are manufactured near Birmingham. **Merthyr Tydfil** and **Swansea** on the South Wales coalfield are engaged in making iron and steel, copper, tin plate (iron sheet coated with tin) and galvanized iron (iron sheet coated with zinc).

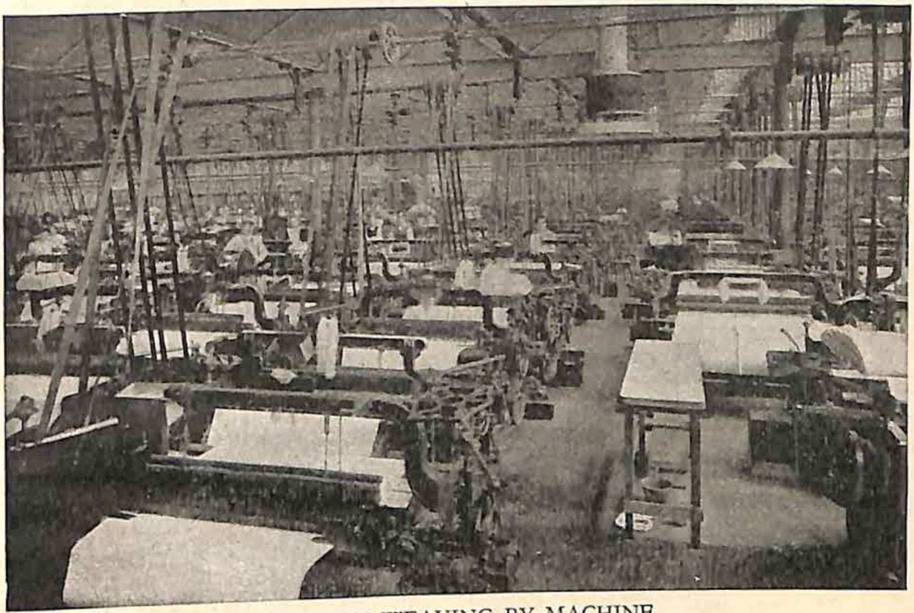


COTTON TOWNS OF LANCASHIRE

An important iron and steel manufacturing town is **Middlesbrough,** near the Northumberland and Durham coalfields. The works of Messrs. Dorman Long, the famous manufacturers of steel joists, are here.

Cutlery is manufactured at **Sheffield** on the southern part of the Yorkshire coalfield. The industry was started here because grindstones are available near by. The knives of Joseph Rodgers are made here.

The banks of the Clyde have the greatest **Shipbuilding** yards in the world. **Glasgow,** the centre of this area, is as large a city



COTTON WEAVING BY MACHINE

After the cotton has been spun and wound on the bobbins, it is woven into pieces of cloth on these machines.

as Bombay. It gets its coal from the Lanarkshire coalfield. Another important shipbuilding area is the estuary of the Tyne. The chief towns here are **Tynemouth** and **Newcastle.** **Belfast** in Northern Ireland and **Barrow-in-Furness** in Cumberland are other shipbuilding centres. Britain is the greatest shipbuilding country in the world.

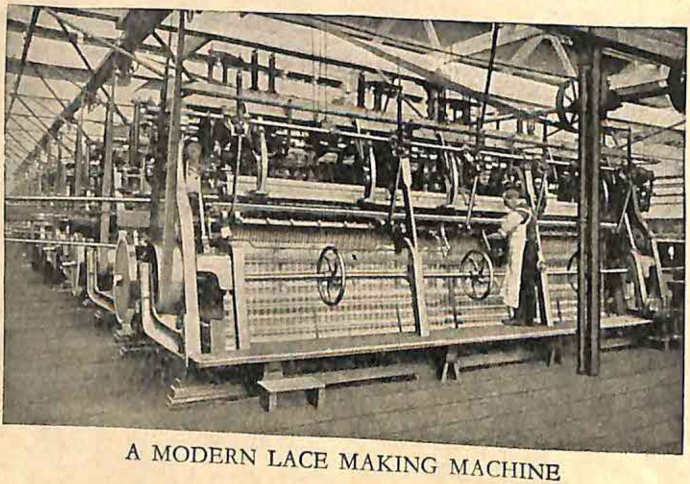
Cotton Manufacture is chiefly carried on in **Lancashire,** the chief advantages there being: (1) cheap coal, and (2) a moist climate. The cotton-manufacturing towns in this area, **Oldham, Blackburn, Bolton** and **Preston** are all situated on the great coalfield west of the Pennines.[1] Damp westerly winds from the Atlantic strike against the Pennines and rainfall is heavy in this region. Fine cotton thread can only be spun in a damp climate as cotton fibres become brittle and break easily in dry air. (Has Bombay a damp climate ?) Cotton is imported from foreign countries

---

[1] The cotton industry was started here even before the discovery of the steam engine. In those days the small streams running down the slopes of the Pennines afforded enough power for the small cotton mills of Lancashire and the woollen mills of Yorkshire.

INSIDE A HOSIERY FACTORY

through the great cotton port of **Liverpool.** We purchase annually about 50 crores of rupees worth of cotton goods from Lancashire. Note carefully that neither **Manchester** nor Liverpool are cotton



A MODERN LACE MAKING MACHINE

manufacturing towns. Liverpool is the cotton port and Manchester is the cotton market.

There are two important cotton manufacturing towns outside Lancashire: **Paisley,** in Western Scotland, manufactures cotton-thread. **Nottingham** manufactures hosiery (vests, socks) and lace. Moist climate is not so necessary here as the threads used for these manufactures are strong.

The **Woollen Industry** is developed on the Yorkshire coalfield to the east of the Pennines. The wool was originally obtained from sheep reared on the hill slopes, but now most of it is imported, mainly from Australia. The principal woollen manufacturing towns are **Leeds, Bradford, Huddersfield** and **Halifax.** A special advantage of this district is the abundance of pure water for washing wool.

A LINCOLN RAM

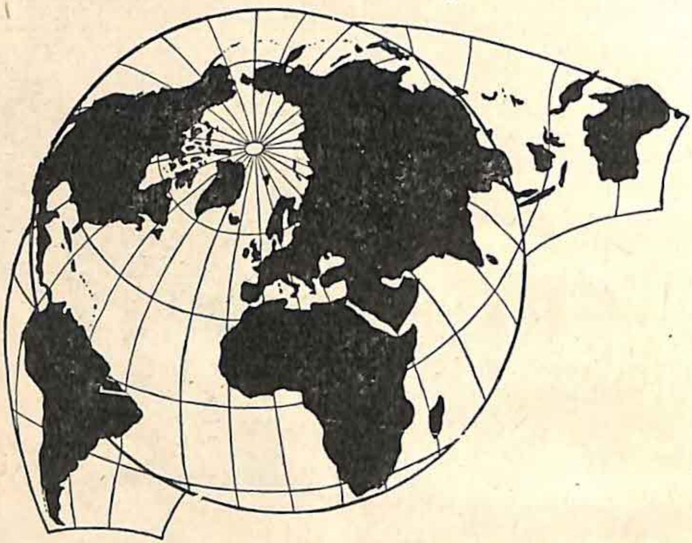
The **Linen Industry** is centred in **Belfast** in Northern Ireland. The industry was started with local flax by some Huguenot settlers (Protestants) who fled from France owing to religious persecution. The industry now depends on imported flax.

The chief centre of **Jute** manufacture is **Dundee.** The jute is imported from Bengal.

Geographical Reasons for the Supremacy of Great Britain. Great Britain has the advantages of (1) a favourable climate,

(2) abundance of coal and occurrence of iron ore near coalfields, (3) good harbours, (4) a position between the continents of Europe and America.

Her Colonial Empire has also largely increased her wealth. She gets food and various raw materials from the countries of the British Empire and has a ready market in her overseas possessions for her manufactured goods like machinery, iron and steel, cotton, linen, woollen, jute and silk goods, boots and shoes, cigarettes, articles of rubber and glass, drugs and chemicals.



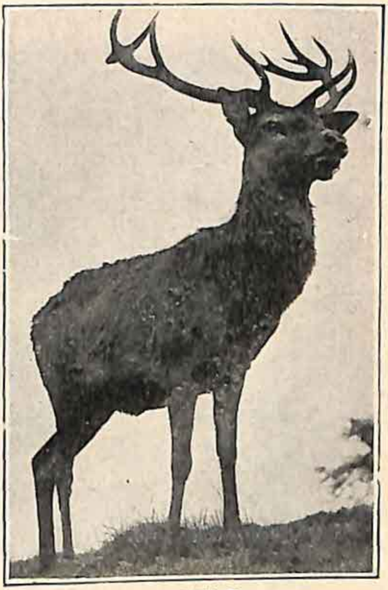
GREAT BRITAIN LIES AT THE CENTRE OF THE LAND SURFACE OF THE GLOBE

She buys raw cotton, jute, tea, hides, oil-seeds and rice from us.

SCOTLAND

The Highlands of Scotland are a rugged region of heather-covered mountains separated from one another by narrow wooded valleys, called *Glens*. The old, hard rocks of this region form a very poor soil, and much of the area is now a deer forest where rich people go stag hunting. Agriculture does not pay in this cold, wet and windy region. Many of the inhabitants have left the country and have gone to all parts of the world. The severe climate of Scotland has produced a physically strong and hard-headed race, and the most valuable export of the Scottish Highlands has long been men.

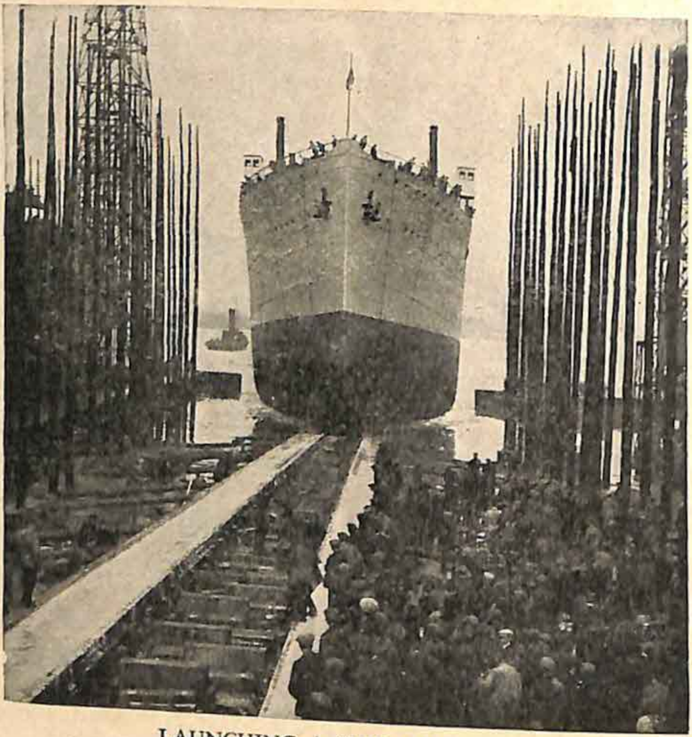
The Midland Valley of Scotland is rich in minerals, and hence it is the most industrial and densely-populated part of the country. (Name the three coalfields of this area.) Two-thirds of the people live here. This is also the only part of Scotland where soil and climate are favourable for agriculture. The Southern Uplands are a grazing district where sheep are reared.



A STAG

IRELAND

Being exposed to the warm and moist westerly winds from the Atlantic, Ireland gets abundant rain throughout the year. Grasses grow luxuriantly in this damp country and the beautiful greenness of the country has made Ireland known as the **Emerald Isle.** Dairy farming is the chief industry on the rich grasslands, and large amounts of butter, bacon and eggs are sent to the densely populated industrial parts of western England. There is no coal in Ireland, but recently the Shannon river has been dammed to supply electricity to the whole of the Irish Free State. Northern Ireland is different from the Irish Free State in several respects. The former is industrial while the latter is agricultural and pastoral. Apart from the geographical factors there are also racial and religious differences. Northern Ireland is chiefly inhabited by the descendants of the English and Scot Protestant settlers established there by James I, while the rest of the Island is inhabited by a Celtic people who are Roman Catholics. These differences have resulted in Northern Ireland remaining attached to Great Britain while Southern Ireland has formed the Irish Free State (Saorstat Eireann).



LAUNCHING A SHIP AT BELFAST

Flax is grown in Northern Ireland and is used for making the famous Irish linen. **Belfast** is the most important industrial town.

The capital of the Irish Free State is Dublin. (Where do Jacob's cream cracker biscuits come from ?)

Famous Universities and Schools of the British Isles. The most famous Universities are those of **Oxford, Cambridge** and **London.** (What do the words *Oxon* and *Cantab.* written in brackets after a degree mean?) The most famous Public Schools of England are at **Harrow** (near London), **Eton** (near Windsor), **Rugby** in the heart of England, and **Westminster** (in London).

VIEW OF OXFORD

QUESTIONS

1. There are many schoolboys in Wales who have never seen a wheat field. Suggest a geographical reason for this.
2. Manchester gets its water supply from the Lake District, Liverpool gets it from a lake in Wales. What conclusions can you draw from these facts?
3. British sea ports are never closed by ice in the winter, but German sea ports on the Baltic Sea are frozen for some time. Suggest an explanation for this.
4. Why is Kent called the 'Garden of England'?
5. Ireland is about as large as Scotland, but has nearly four times as many cattle. Can you explain why?

   (Cattle do not thrive on the poor grass of moors and higher hills, or in places where the weather is cold, but sheep can.)

APPENDIX A

GEOGRAPHICAL EXCURSIONS

GEOGRAPHICAL excursions should always be undertaken with a definite **purpose.** Brief investigations can be carried out by groups of boys under the guidance of the teacher to discover facts of local geography. A brief list of problems that may be investigated in this way is given below :—

1. Where do the main roads, railways, canals of our town or village go to and come from ? How far away are these places ? What are they like ?

2. What crops do the farmers in the neighbourhood of our town or village grow ? Do they grow the same things every year in the same fields ? What are the chief crops grown in the rains ? in the winter ? When are they harvested ? What manures are used by farmers in their fields ?

3. What are the various industries of our neighbourhood ? What things are made in the ——— factory ? How are they made ? Where do they get the raw materials from ? Do these come by rail, steamer, bullock-cart or country boat ? Where do they send the manufactured articles ?

4. How does our own district differ from the one we recently visited with regard to (a) scenery, (b) crops raised, (c) industries ?

5. What are the sources of our water supply ? Are there any tanks or rivers near by ? Where do these get their water from ? What uses are made of the water ? What happens to the waste water ?

6. What fuel do we commonly use in our homes ? Where does it come from ?

7. Can we get an idea of the chief products of our districts from visits to the Railway Station or the Steamer Ghat ?

8. What are the common trees of our town or village ? How many of them supply us with useful products ? Which of the trees are deciduous ? Which are evergreen ? When do the trees shed their leaves ?

9. What methods are employed by peasants to irrigate their fields in our parts ?

10. What fruits are commonly sold in our bazaars ? Which of them are grown locally and which are imported ? Where do the latter come from ?

11. Make a rough plan of our village or town showing (1) our school, (2) the main roads, (3) important buildings, (4) the main sources of water supply.

12. What is the ultimate destination of all the rain that falls in our town or village ?

13. Are there any places of historical interest in our neighbourhood? If so, why are they famous?

14. What are the main occupations of the people in our locality? What is the chief occupation?

15. What vegetables are grown by market gardeners in the suburbs of our town?

16. What types of articles are sold in our local market? From what places do these come?

17. What is the nature of the soil in our neighbourhood—is it stiff black clay, or loam (sand + clay), or largely composed of broken particles of rock with a little clay, or reddish-brown laterite?

The main object of the teacher in conducting geographical excursions will be to awaken the boys' interest in their immediate surroundings, both animate and inanimate. The students should first study the life and habits of their own people and compare them with the life and habits of other peoples living in different environments of whom they have read in books. In the course of outdoor work, observation should be made of (1) the changeful aspect of nature corresponding to the changes of the seasons; (2) the apparent movement of the sun across the sky and the varying altitudes of the sun in different times of the year; (3) the connexion between direction of wind and weather; (4) the action of flowing water; (5) the work of the various agents of denudation; (6) the sowing and harvesting of crops at different times of the year. The boys should examine, note and compare facts for themselves, and should be trained to associate cause and effect in an elementary way. They should also be able to explore unknown country with the help of maps and compass. Every excursion should have definite aims and should be planned by the teacher beforehand. It is desirable that the teacher should make a preliminary survey of the district to be visited and should see that the boys make notes of what they observe and draw rough plans of the area traversed. Journeys over the same ground at different times of the year will direct attention to the effect of seasons on plant life.

APPENDIX B

A BRIEF GLOSSARY OF GEOGRAPHICAL TERMS USED IN THE BOOK

Alluvium.—Very fine particles of soil and sand carried by running water and deposited in river beds, or in a river valley during floods. The Indo-Gangetic Plain is formed of alluvium.

Anthracite.—A very hard coal. It gives great heat, burns with very little flame and is always preferred for steam-raising or in the smelting of metals.

Atmosphere.—The air surrounding the earth. It is composed of two gases, oxygen and nitrogen, and has varying amounts of carbon-dioxide and water vapour in it. It extends to a height of about 200 miles.

Axis (of the earth).—An imaginary line joining the poles and passing through the centre. It is the axle round which the earth rotates.

Barometer.—An instrument for measuring the weight (called pressure) of the atmosphere at any place. Pressure above 30 in. is called high pressure, pressure below 30 in. is called low pressure.

Basin (River).—The area drained by a river and its tributaries.

Canal.—A man-made watercourse for irrigation or navigation.

Climate.—The average of weather conditions over a long period in any part of the world.

Cloud.—A mist high up in the sky.

Coaling Stations.—Ports where coal (or oil) is stored for supplying to ships. They are necessary because ships cannot carry all the coal (or oil) that they may require during the whole period of their voyage.

Coast.—The strip of land which lies near the sea. There are two kinds of coasts, regular or unbroken and irregular or broken. The western coast of England is an example of a broken coast; the coast of the Deccan is a regular coast.

Condensation.—The process by which the invisible water-vapour in the atmosphere becomes visible as dew, mist, fog, cloud, rain, hail or snow.

Cyclone.—An area of low air pressure in which there is a gradual decrease of pressure towards the centre. This low pressure system moves rapidly from one place to another and is accompanied by cloudy skies, stormy winds and heavy rain.

Dam.—A wall built across a river valley to form a lake. The water thus held may be used to supply towns, irrigate fields or generate electricity.

Delta.—A triangular piece of land composed of silt brought down by a muddy river and deposited at its mouth.

Denudation.—The breaking up of rocks by the action of air, wind, rain, flowing water, frost, glaciers and the sea.

Dunes.—Hillocks of moving sand heaped up by the wind.

Equinox.—The time of the year when day and night are equal (21 March and 22 September).

Estuary.—The part of a river mouth up which the tides flow.

Evaporation.—The process by which a liquid like water is changed to an invisible gas. Opposite of condensation.

Fold Mountain.—A mountain formed by the folding or crumpling of a part of the earth's surface, e.g. the Himalayas.

Ghats.—A flight of stairs leading down to a river. A mountain pass. Ranges of mountains running along the western and eastern coasts of the Deccan.

Great Circle.—A circle whose plane passes through the centre of the earth.

Head of Navigation.—The highest point up a river to which vessels can go.

Horizon.—The line bounding our sight where earth and sky seem to meet.

Irrigation.—Artificial watering of fields.

Lagoon.—A shallow portion of salt (or fresh) water cut off from the sea wholly or partly by a tongue of land or a sand bank.

Latitude.—The angular distance of any place on the earth's surface, north or south of the Equator. The latitude of the Equator is 0°, of the North Pole 90° N.

Lava.—Molten rocks poured out from the interior of the earth through holes (volcanoes) or cracks on the earth's crust.

Longitude.—The angular distance of a place on the surface of the earth, measured in degrees, east or west of Greenwich.

Meridian.—A great circle (q.v.) on the earth's surface passing through the poles and cutting the Equator at right angles.

Millet.—A kind of grass from which a small sized grain is obtained. Used as food by poorer people who cannot afford to buy rice or wheat. Also given to poultry. There are various kinds: *jowar, bajra, ragi, keoni, shama, kodo, marua, makai,* etc.

Monsoons.—Seasonal winds blowing over the Indian Ocean and south-eastern Asia. In winter months, the monsoon blows from the north-east, in the summer months from the south-west. The change from one monsoon to another is a time of violent storms.

Oil-seeds.—The seeds of a large number of different kinds of plants from which an oil is obtained by crushing. The most important oil-seeds of our country are: (1) cotton seed (the oil is used for mixing with more costly oils used for food, like olive oil; also in making soap and candles); (2) copra or dried coconut (the oil is used for cooking in the Deccan; it is also used largely in the manufacture of artificial butter, soap, candles); (3) ground nuts (the oil is used for the same purposes as cotton seed oil and coconut oil); (4) castor (the oil is used in lamps; also as a lubricant and in medicine); (5) mustard (the oil is used for rubbing the body with and in cooking foods); (6) *til* or sesamum (the oil is used in cooking or as a hair oil); (7) linseed or *tisi* (the oil is used in the making of paints and varnishes).

Pulses.—Certain plants of the pod-bearing or pea family, the seeds of which are used as food. The common pulses (*dal*) of our country are *moong*, *masoor* (lentil), *chana* (gram), *urid*, *khesari*, *matar* (pea), *seem* (bean), *rahar*. The cheaper kinds like *khesari* are also used as cattle food.

Radiation.—The process by which heat is lost by a hot body.

Solstice.—The time in summer and winter when the sun is vertical at its greatest distance north or south of the Equator, and seems to stand still before starting to move in the opposite direction. June 22 is usually the day of the summer solstice, and December 22 or thereabouts is the winter solstice.

Spices.—Fragrant and pungent substances used to give flavour to foods. The principal spices used by us are turmeric (*haldi*), coriander (*dhania*), capsicum (*lal mirch*), pepper (*gol mirch*), bay leaf (*tej patta*), cinnamon (*darchini*), cardamom (*elachi*), clove (*laong*), ginger (*adi*). Less commonly used spices are saffron (*jafran*), nutmeg (*jaitri*), and camphor (*kapoor*).

Tropics.—Literally 'turning points', are the parallels of latitude 23½° north (Tropic of Cancer) and 23½° south (Tropic of Capricorn) of the Equator. The tropics mark the northern and southern limits of places on the surface of the earth that receive vertical rays from the sun at noon on some days of the year.

Valley.—A piece of low land lying between two ridges of higher ground.

Water Power.—Energy obtained from a water-fall. This may be used directly for turning machinery or may be made to generate electricity by working a dynamo.

Weather.—The atmospheric conditions for a short period (day, week, month) as distinguished from climate which is the average of such conditions over a very long period.

Weathering.—Same as denudation (q.v.).

Wind.—Air in motion from a high pressure to a low pressure area. A wind is named from the direction *from* (not *to*) which it blows.

Wood-pulp.—A pulpy material prepared from the wood of coniferous (soft-wooded) trees by grinding or using chemical agents. Largely used for making paper and artificial silk.

APPENDIX C

THE questions given below are framed to test the ability of pupils to apply the knowledge obtained from reading this book. It is suggested that one period a week be given to a discussion in the class of questions selected from this collection. Pupils may be allowed to consult maps and books to find out the answers. This will give them an insight into geography which is not possible from a purely passive reading of books.

QUESTIONS FOR CLASS DISCUSSION

1. How do you account for the low rainfall over the Indus basin compared with that over the basins of the Ganges and the Brahmaputra?
2. What geographical explanations can you offer for the following: Karachi has a rainfall of 7 inches; Mymensingh (East Bengal) in the same latitude has a rainfall of 93 inches. (Patna Matric. 1935 A.)

3. What is the direction of wind over India from March to September? What does the wind blow over before reaching India? How does its previous course affect the condition of the air when it reaches this country? What happens when it reaches a mountain chain? How must the chain be placed to cause the maximum rainfall?
4. The total number of storms in the Bay of Bengal during a twenty-five year period is given below:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	1	4	13	18	41	36	45	34	22	8

Can you deduce from the above figures any relation between the monsoon and these storms?

5. Which parts of India have (*a*) rain mainly in summer, (*b*) more rain in winter than in summer, (*c*) very little rain at any time of the year?
6. How does the captain of a ship find his position at sea?
7. Name in order the different countries which border on India.
8. Why is Delhi warmer in summer and colder in winter than Calcutta? Why is the rainfall of Delhi much smaller than that of Calcutta?
9. How does the Indo-Gangetic Plain get all the water that falls as rain or snow on both the northern and southern slopes of the Himalayas?
10. Explain clearly with diagrams the reasons for the difference in the hours of daylight on June 21 and December 22 at the North Pole and at Patna. (Patna Matric. 1934 A.)
11. What effect have the Himalayas on the general direction of the monsoon winds? How does the rainfall vary from east to west along the Northern Indian Plain? Why?
12. Do mountains increase or decrease in height in course of time? What brings about the change?
13. Why has the west coast of India a greater rainfall than the east coast?
14. A flake of snow falls on a Himalayan peak, 25,000 feet high. Describe what is likely to happen to it subsequently. (Patna Matric. 1934 A.)
15. In what respects is the climate of India suitable for agriculture? What is the chief defect of our climate? How is it possible to remedy this defect?
16. Try to explain the following facts with the help of your atlas:—
    (*a*) There is a railway line running all along the east coast of India from Calcutta to Rameswaram, but only a very short length of line (Calicut—Mangalore) on the west coast.
    (*b*) Cherrapunji has an average annual rainfall of nearly 500 inches, while Shillong, only about thirty miles to the north, has an annual rainfall of 83 inches.

(*c*) The average price of land in Bombay is much greater than in Calcutta.
(*d*) The southern slopes of the Himalayas are more forested than the northern slopes.
(*e*) Eastern England is mainly agricultural, western England is mainly industrial.
(*f*) The docks of Bombay face the mainland and not the Arabian Sea.
(*g*) Arabia lies mainly between the same latitudes as India, but in many parts of Arabia water is known to freeze at night.

17. With the help of a globe on which British possessions are coloured red, show that the sun never sets on the British Empire.
18. What fraction of the earth's diameter is the height of Mount Everest?
19. Why is the climate more uniform near the ocean than in the middle of a large continent?
20. The height of the snowline in the Himalayas is about 17,000 feet. There are hundreds of peaks in the Himalayas which have a greater height than this. Deduce from the above statements how India has some protection in the event of failure of the monsoons.
21. What do you understand by these statements?—
    (*a*) The oldest mountains are not the highest.
    (*b*) Old mountains are composed of hard rocks.
    (*c*) Hills are older than mountains.
22. Why are the rivers of peninsular India much less constant in volume than the rivers of northern India?
23. Why are there no railways over the Himalayas?
24. For what different purposes are canals used? In what parts of India are they most numerous? Why?
25. What are the advantages and disadvantages of river transport over transport by land?
    Why do seaports often develop near the mouths of rivers?
26. Why are there no rivers in Baluchistan?
27. Why do roads and railways often follow the courses of rivers?
28. Why are millets not exported from India?
29. When it is day in Patna, what parts of the world are having night? [Answer this question with the help of a globe and a lamp.]
30. Why is Karachi the chief wheat-exporting port of India?
31. The eastern part of the Indo-Gangetic Plain is wetter than its western part, but in the Deccan it is the other way about. Explain why this is so.
32. Study on the map the railway connexions of Delhi with Karachi, Bombay, Madras, Calcutta and Simla. With which of these is there (*a*) air, (*b*) water, (*c*) rail connexion?
33. In which parts of India would you expect to find the hottest summers and coldest winters? Why?

34. Examine on a map how the Brahmaputra acts as a barrier between the E.B.R. and the A.B.R.

35. How far are floods harmful and how far are they useful to man? Why do many people live in countries where the rivers overflow or are likely to overflow their banks every year?

36. In what parts of India do we find the closest network of railways? Explain.

37. Why are areas of greater rainfall generally found near the coast?

38. In what sense is Vizagapatam a rival of Madras?

39. Explain why corrugated iron roofs are common in Assam but in the Punjab the people prefer to have flat roofs beaten with earth.

40. From which parts of India would you expect each of the following to be sent out?—

(*a*) Rice, (*b*) Petroleum, (*c*) Jute, (*d*) Tea, (*e*) Cotton, (*f*) Wheat, (*g*) Lac, (*h*) Mica, (*i*) Pig iron, (*j*) Cotton goods, (*k*) Coal, (*l*) Salt, (*m*) Gold.

41. Explain briefly what you understand by the terms, the Old and the New Worlds. Why have the names been given?

42. On an outline map of the world mark the *main* mountain ranges.

43. Measure on a map of India the total distance in miles that an aeroplane would cover in a journey from Karachi to Calcutta, assuming that it flew in a straight line.

44. What are the things you would describe about a climate if you wanted to give a really full account?

45. Why does snow fall in certain parts of the world near the Equator?

46. When is one place said to be the *antipodes* of another? The latitude and longitude of Calcutta are 22° 34′ N. and 88° 24′ E. respectively. Show on a map the position of the antipodes of Calcutta.

47. Explain clearly why there is almost always a southern breeze in Calcutta during the summer in the evening.

48. Explain how regions near the Equator get more heat from the sun than the polar regions.

49. Account for: (*a*) The desert region of Rajputana, (*b*) The heavy rainfall in Assam, (*c*) The winter rains in Madras, (*d*) The summer floods in the Indus Valley.

50. What are the causes of heavy rainfall in a country?

51. What are the causes that have made Calcutta a large and prosperous city? Is there any likelihood of Patna ever being such a large city as Calcutta? Discuss.

52. What is meant by the statement: 'A large part of the total rainfall of India is wasted on the west coast'?

53. What is the cause of the variation of time all over the world?

54. (*a*) Why are nights cooler than days?
    (*b*) Why is June warmer than December?
    (*c*) Why are cloudy nights warmer than clear nights?
    (*d*) Why are cloudy days cooler than clear days?
    (*e*) Why are the morning and the evening cooler than the noon?

55. Why, in Patna, is it not necessary to have a verandah on the north side of a house?

56. What has led to the rapid increase in the population of the Punjab during the last twenty years?

57. Robinson Crusoe describes the climate of his island as follows:—
    'February to April—rainy season; May to mid-August—dry season; mid-August to October—rainy season; November to January—dry season.' He also says that he got two crops in the year. Discuss the possible locality of this island.

58. 'The areas of densest population and heaviest rainfall coincide.' Why is the above statement true for monsoon lands but not for equatorial or temperate lands?

59. On what does the difference of temperature at different seasons of the year depend?

60. Explain how it is that travelling along the Equator we have to change the time of our watch, but travelling along a meridian we have to change our dress as we proceed.

61. Explain with a diagram why days and nights are ordinarily not of the same length. Are there any particular dates on which days and nights are of equal length? In what parts of the world are days and nights always of equal length? Explain with diagrams.

62. In what parts of India would you expect to find (*a*) cotton mills, (*b*) woollen mills, (*c*) manufacture of coconut oil, (*d*) coffee plantations, (*e*) carpet weaving, (*f*) manufacture of iron and steel, (*g*) flour mills, (*h*) rice mills?

63. Account for the fact that rainfall decreases as we go up the Ganges Valley but increases as we go up the Indus Valley.

64. Explain with a diagram why the summer days should lengthen and the winter days shorten as we move away (north or south) from the Equator.

65. Explain why it is that in England 25 inches of rainfall is sufficient for agriculture, but in India this amount would be considered very small.

66. Famines have not occurred in India in recent years. Can you guess the parts of the country that suffered most from famines in the past?

67. Classify the rivers of India under two headings: (*a*) useful for navigation, (*b*) useful for irrigation.

68. Look at the tables below :—

Ganges River

Distance from source in miles	Height in feet
0	10,300
25	6,000
75	1,500
175	600
1,450	sea-level

Brahmaputra River

Distance from source in miles	Height in feet
0	15,500
425	13,800
600	12,000
1,050	6,000
1,087	1,500
1,100	600
1,800	sea-level

Draw rough graphs from the data. Which portions of each river are suitable for navigation? In which part would you expect to find water-falls?

69. Suggest explanations for the following :—
   - (*a*) There is more evaporation over the sea than over the land.
   - (*b*) A mountainous country has a heavier rainfall than a flat country.
   - (*c*) The earth is our great time-keeper.
   - (*d*) The South-West winds in England generally bring rain, but the East wind is followed by dry cold weather.
   - (*e*) People go to hill stations only in summer but to seaside places all the year round.
   - (*f*) Too much or too little rain is good neither for agriculture nor for human settlement.
   - (*g*) The Australians celebrate their Christmas in summer.
   - (*h*) The Eastern counties of England are mainly agricultural, but the Midland and the Western counties are mainly industrial.
   - (*i*) There is no railway connexion between Burma and the rest of British India.

70. What change will you notice in the length of the shadow cast at noon by a stick placed vertically on March 21, June 21, September 22 and December 21?

71. Describe the changes brought about by (*a*) water, (*b*) air, (*c*) the sun on the surface of the earth.

72. In what direction will the sun be at mid-day at: (*a*) Madras on June 21, (*b*) Colombo on September 22, (*c*) Lahore on June 21, (*d*) Calcutta on December 23?

73. Darjeeling and Agra have nearly the same latitude. The former place is much cooler in summer than the latter. Explain clearly how this happens.

74. You will find it easy to name a dozen important towns situated on the banks of the rivers of the Indo-Gangetic Plain. Can you think of similar big towns on the banks of the rivers of the Deccan? If not, why not?

75. The average monthly rainfalls of Madras and Hazaribagh are given in the following table:

	J	F	M	A	M	J	J	A	S	O	N	D	
Madras	1	0	0·5	0	2	2	4	5·5	4·5	11	19·5	5	in.
Hazaribagh	0·4	0·8	0·7	0·4	1·6	8·3	12·6	12·7	8	3·4	0·3	0·2	in.

How do you account for the difference?

76. Which parts of Europe receive rainfall throughout the year, which in summer mainly, which in winter mainly, and which scarcely at any time of the year?

77. Name the parts of India where we get (*a*) maritime or oceanic climate, (*b*) monsoon climate, (*c*) extreme or continental climate, (*d*) mountain climate, (*e*) desert climate.

78. What changes would have taken place in the climate and physical features of India if the Himalayas did not exist?

79. Name all the conditions that make a port prosperous. Can Karachi ever be as great a port as Calcutta?

80. Parasnath Hill is about 4,500 feet high. There is reason to believe that the mountain was much higher originally than it is now. Give an account of the various natural forces that have reduced the mountain to its present height.

81. In England, in winter the sun rises at about 6 a.m. and sets at about 4 p.m. In summer, the sun rises at about 4 a.m. and sets about 8 p.m. At Colombo, the sun rises at about 6 a.m. and sets at about 6 p.m. throughout the year. Explain how this happens, with the help of a diagram.

82. Suggest geographical explanations for the following:—
    (*a*) Bombay is a busy industrial town in spite of the fact that there are no coal mines within 500 miles of the city.
    (*b*) Of all the Indian Provinces, Bengal grows the largest quantity of rice, but Burma is the largest exporter.
    (*c*) Though Bengal is densely populated, there are only two towns in the Province which have a population of over one lac.
    (*d*) The summer temperature of Lahore in June is much higher than that of Colombo which is nearer to the Equator than Lahore.
    (*e*) Well-irrigation is chiefly practised in Northern India and tank-irrigation in Southern India.
    (*f*) The Punjab, with a rainfall of about 20 inches, is less likely to suffer from famine than Bengal with a rainfall of over 60 inches.

83. Explain with the help of diagrams why in summer we get plenty of time for games after school is over, whereas in winter it is not so.

84. Describe how the several factors of climate may exert their influence at the same place and partly counteract one another.

85. Suggest possible explanations for the following facts :—
    - (*a*) Although the summer temperatures of Darjeeling and London are about the same, it is much more comfortable to walk in the sun in June in London than it is in Darjeeling. (Latitude.)
    - (*b*) The equatorial regions are *not* the hottest parts of the earth.
    - (*c*) July is the hottest month in most countries of the northern hemisphere, but in India it is June.
    - (*d*) In some parts of the world there is only one season.
    - (*e*) Cawnpore is an industrial town although it is situated at a distance of over 400 miles from the nearest coalfield.
    - (*f*) There are cotton mills in Bengal, although the raw material has to be imported from the other end of India.
    - (*g*) Cotton is both imported and exported from India.
    - (*h*) There is a network of railways in the north-east of Chota Nagpur.
    - (*i*) A great many Pathans and Gurkhas are to be found in British India, but very few Indians are to be seen in Afghanistan or Nepal.
    - (*j*) Salt from Cheshire (England) is cheaper in Calcutta than the rock-salt of the Punjab.
    - (*k*) The people living in the mountainous parts of India are less civilized than the plain-dwellers.
    - (*l*) There is a regular steamer service on the Brahmaputra, but none on the Indus.
    - (*m*) There are hardly any canals in Bengal.
    - (*n*) There are no cantonment towns to guard the northern boundary of India.

86. What part does water play in moulding the surface of the earth? Describe some of the striking changes that would take place on the earth's surface if all the water on it were suddenly removed.

87. Why is the summer (June—July—August) rainfall at Patna greater than that at Lahore? Why is the winter (October—November—December) rainfall at Madras greater than at Bombay? Draw rough sketches to illustrate your answer.

88. What are the various ways in which your nearest river gets its supply of water? What are the causes that bring about a change in the volume of water carried by rivers from time to time?

89. Why are mountain ranges generally the most thinly peopled parts of a country? Why are mountains mostly forested?

90. The average annual rainfall of London is the same as that of Udaipur. Explain why the latter is in a desert country but the former is not.